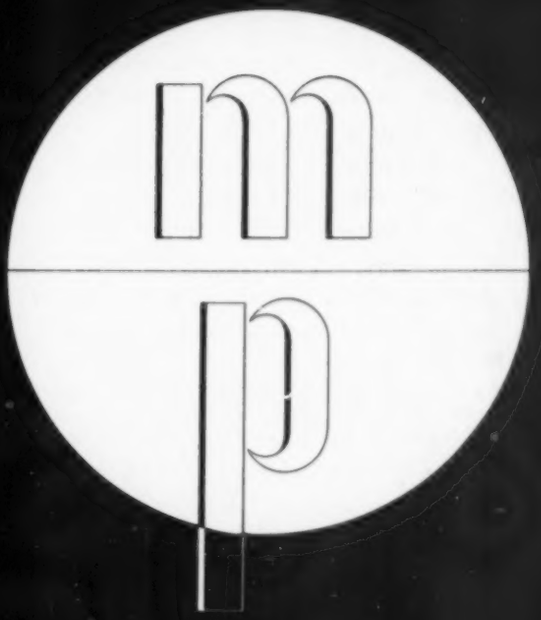
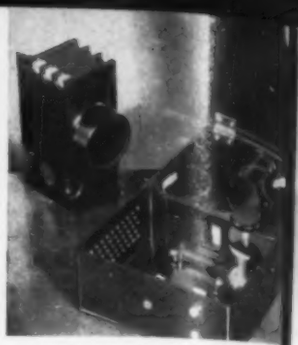
MODERN PLASTICS



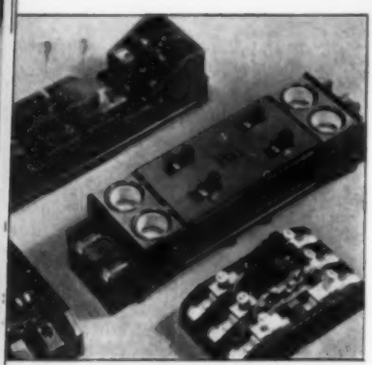
NOVEMBER 1934

"...molded of DUREZ"

DISPLAYS



PHOTOGRAPHIC EQUIPM



ELECTRICAL EQUIPMENT

UTENSILS

The varied types of products shown here are just a few of the hundreds that carry the phrase "molded of Durez."

Each proves that Durez offers manufacturers an opportunity of producing a better product *with a possible saving in production cost.*

CHECK YOUR PRODUCT WITH THESE ADVANTAGES DUREZ OFFERS YOU:

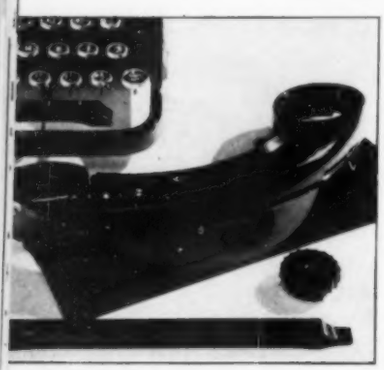
Is the shape so intricate that it requires two or more operations to produce?
An intricate shape like this projector case was produced in one operation with Durez.

Are two or more materials used when one might do?
The switch terminals shown need no extra material for insulation because Durez is an insulator in itself.

Is an extra process necessary for finishing?
The lustrous, durable finish of the radio cabinet, and the display stand was obtained in the same single operation that produced their different shapes.

Does your product retain its beauty under hard usage?
The finish on the tea pot handle and the typewriter parts is permanent because Durez will not scratch, chip, or peel.

Our laboratories and engineering staff will be glad to give you further particulars on the application of Durez to your product. Write: General Plastics Inc., 264 Walck Road, North Tonawanda, New York.



OFFICE MACHINES

RADIOS

HEAT PROOF—The Durez parts of this heater are exposed to boiling water. Resistance to heat and dimensional change was necessary if this article was to stand up. Durez was chosen because it gave these qualities, and insulated the unit besides.

CHEMICALLY INERT—The antiseptic liquid contained in the base of this Sanitator is composed of several active chemicals . . . among them alcohol. Durez, being inert to the action of these chemicals, permits the molding of an attractive case which will last as long as it is used.

STRUCTURAL STRENGTH—The molded frame of this Bates numbering machine stands up under constant pounding. Even when it is used thousands of times per day, the Durez frame is in no way weakened. Besides being strong, the frame is light, making it less tiring to use.

RESISTANCE TO ARCI
The entire case of this autom ignition coil is molded of D Arcing paths caused by greas not burn through the Durez causing failure of the coil. coil, too, is waterproof and operate immersed in water.

VOLUME TWELVE NUMBER THREE

NOVEMBER 1934

MODERN PLASTICS

WITH WHICH IS COMBINED PLASTIC PRODUCTS

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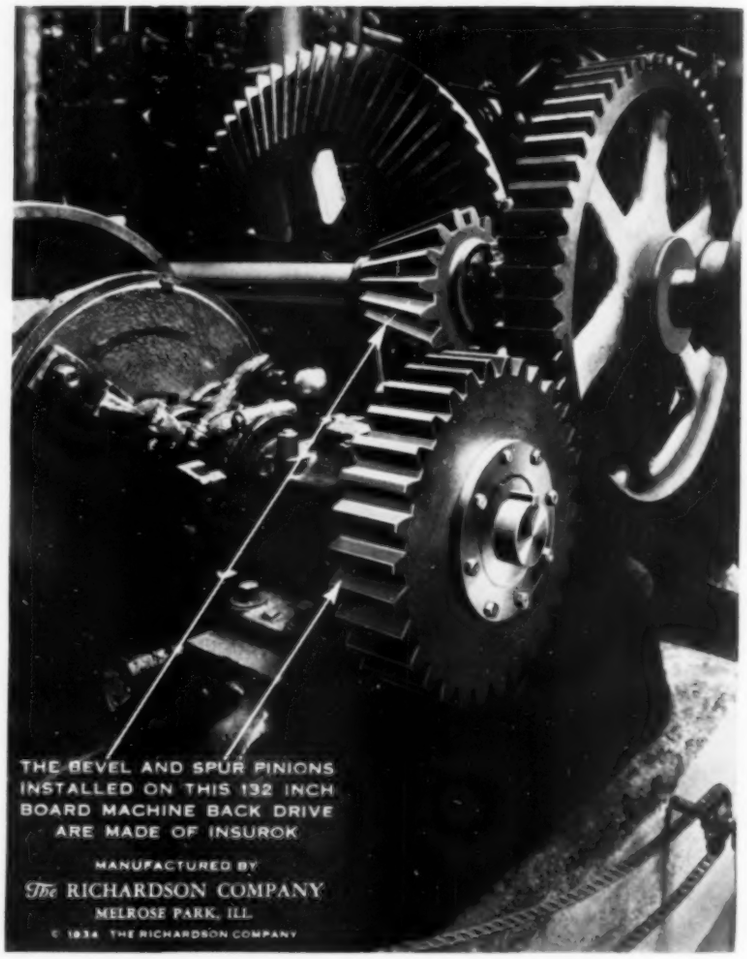
Do You Need a Material to Withstand Severe Mechanical Service?

A manufacturer had a problem . . . production schedules were off . . . operations were interrupted for replacement of noisy, inferior parts . . . Richardson Representatives were called in. Insurok pinions were installed . . . and the result—noise eliminated . . . production has continued for many months uninterrupted and the Insurok parts show no signs of wear. INSUROK will assist you in improving your production and products.


THE BEVEL AND SPUR PINIONS INSTALLED ON THIS 132 INCH BOARD MACHINE BACK DRIVE ARE MADE OF INSUROK
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These INSUROK pinions absorb a tremendous amount of back lash and are subject to extreme service conditions as they drive a bank of 20 dryers, each having a face of 145" x 42" in diameter and they have lasted longer than the type they replaced.

Why INSUROK replaces other materials

Tougher!
More resilient!
Uniform in structure!
Easily fabricated!
Stronger for its weight!
High dielectric!
Non-conductor of heat!
Non-corrosive!
Mechanical shock absorber!
Fabricated to your order!

INSUROK chemically resists most reagents, acids, solvents, oils and other liquids. Does not corrode nor deteriorate but rather improves with age.

INSUROK is available in a multitude of forms of a grade and thickness for every service . . . for high heat resistance . . . for unusual toughness . . . for severe mechanical service . . . for high dielectric, as well as in a wide range of colors and finishes to suit varying applications.

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MODERN PLASTICS

BRESKIN AND CHARLTON PUBLISHING CORP.
NOVEMBER, 1934 VOL. 12, NO. 3

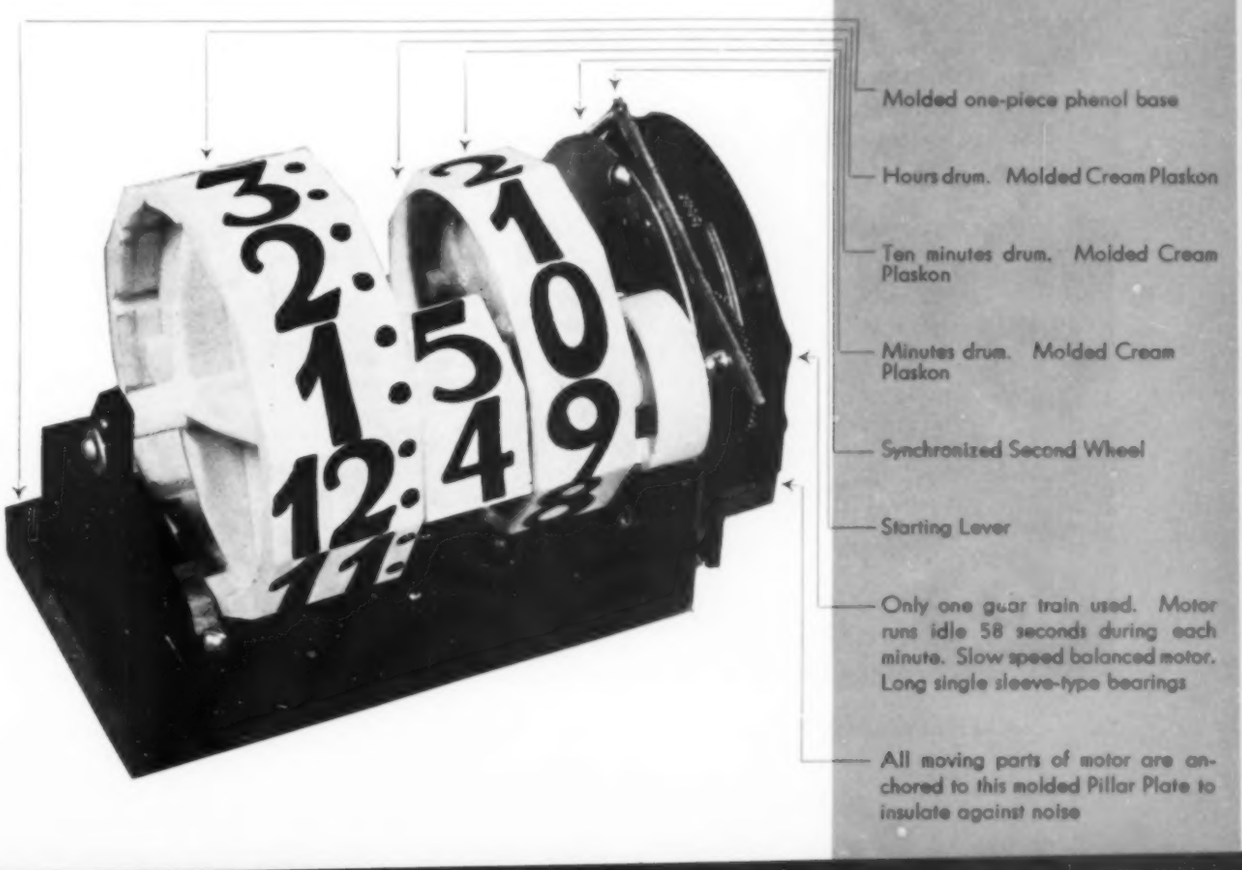
THE ALL-MOLDED CLOCK MAKES ITS BOW

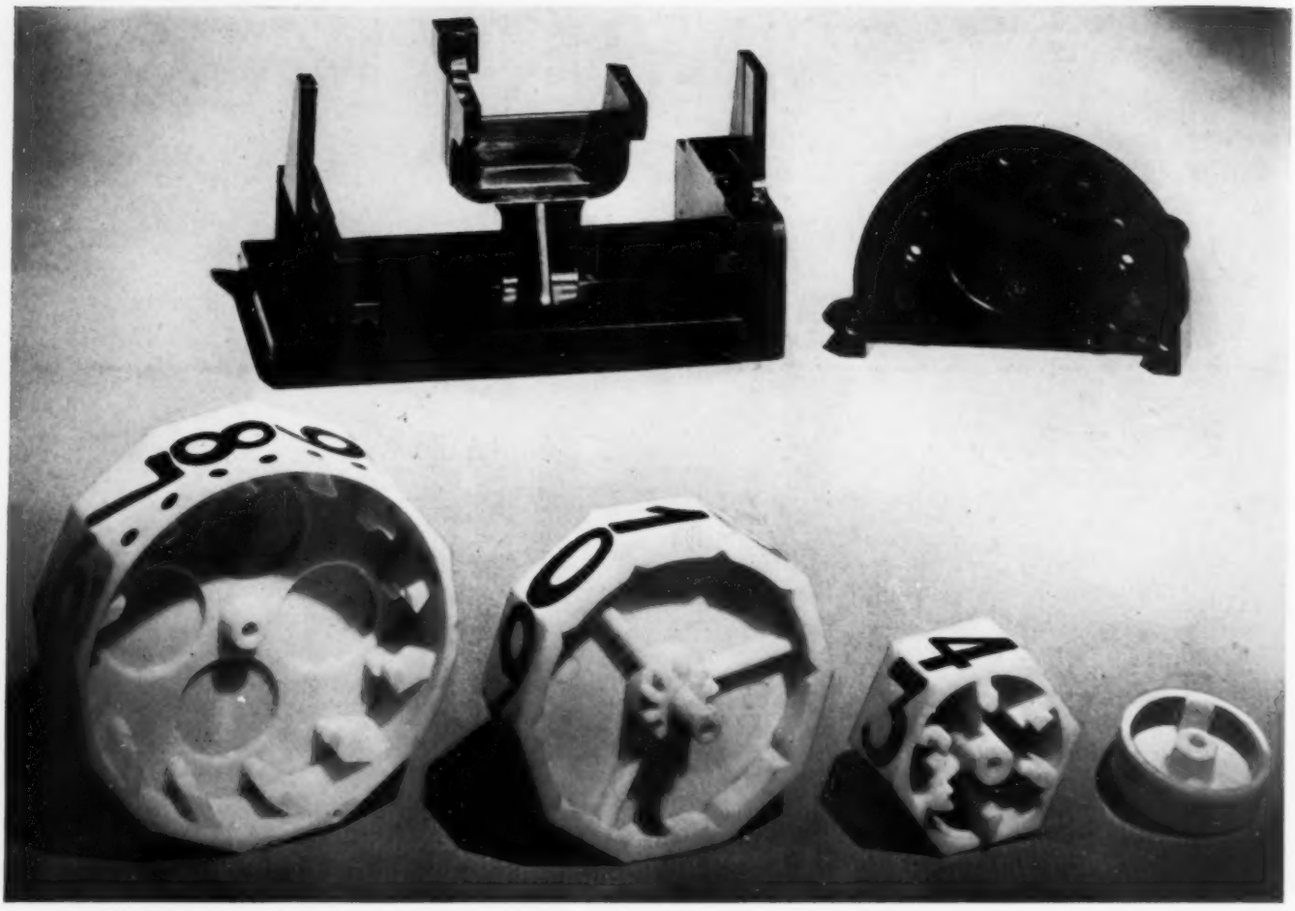
MOLDED clock-cases have been common for a number of years. Some have been well designed . . . some have been so-called "dogs." Some have imitated earlier materials such as wood and marble . . . others have openly admitted their identity. Today, the problem of encasing a clock in molding is essentially one of design—a problem in which an intelligent study of the market will lead to an intelligent and usually successful solution.

But the all-molded clock? There's a different story. A story closely tied up with the development of electric clocks in general—and of electric clock sales methods in particular. For the electric clock, curiously enough, is a simpler mechanism than the mechanical clock. The application of electricity as a driving force eliminates much complicated and expensive control and driving mechanism—actually reduces the cost of making a *good* clock, one that will continue to accurately record the time for a long period of years.

Thus the advent of the electric clock mechanism has induced two distinct trends in clock merchandising, running counter to each other. On the one hand, because of the novelty of the electric movement and the superior accuracy it affords, there appeared a group of clocks in the middle and higher price brackets characterized by the elaboration of their cases and the beauty, or at least, the richness of their design. In this group, superiority of the timepiece led to the use of superior cases, and the two together justified a higher price than would have been formerly obtained for equal or nearly equal mechanical models.

However, another group of clocks shortly appeared, in which advantage had been taken of the lowered cost of the movement, and these were sold at prices which

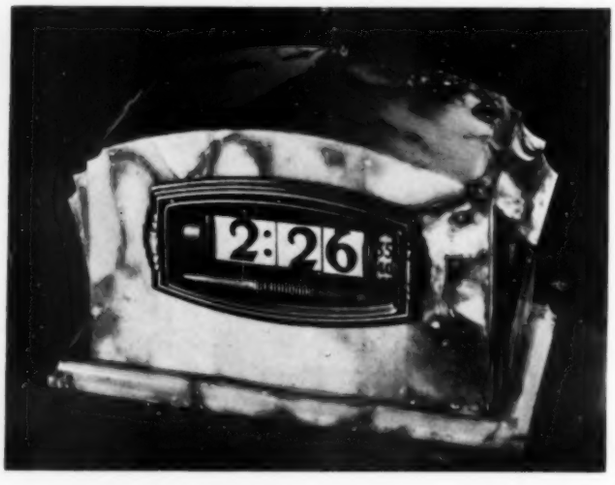

Molded one-piece phenol base
Hours drum. Molded Cream Plaskon
Ten minutes drum. Molded Cream Plaskon
Minutes drum. Molded Cream Plaskon
Synchronized Second Wheel
Starting Lever
Only one gear train used. Motor runs idle 58 seconds during each minute. Slow speed balanced motor. Long single sleeve-type bearings
All moving parts of motor are anchored to this molded Pillar Plate to insulate against noise



The six molded parts of the Pennwood Clock mechanism. Note the intricacy of the molding on the time drums—achieved by means of split molds

permitted active competition with low-priced models.

Thus a manufacturer today is confronted with the choice of entering either the highly competitive low-priced field, the rapid narrowing high-priced field (in which the advantages of long runs and mass production are becoming less and less attainable) or of striking a middle course by carrying the advances inherent in the electric clock mechanism to their logical conclusion and producing a clock completely new, in materials as well as in principle.



One of the nine models utilizing the all-molded clock mechanism. The clock case is of Plaskon, in a marble finish

Such a clock is the Pennwood. In planning its clocks the Pennwood Company decided to follow the current trend in eliminating the hands-and-face type of indicator and substituting four geared drums which make possible instant and automatically accurate time reading.

Having made the decision it was soon discovered that molded plastics, which not only offered distinct appearance advantages but also instantly minimized the fabrication costs for the intricate and accurate gearing necessary to carry the motor's impulse through the four drums, could be made an integral part of the drums when molding was used. No expensive fabrication, no delicate and hence expensive machining, such as metal would require, was needed when these drums were molded. And, once the master molds were made, the accuracy of each of tens-of-thousands of drums was assured. Thus, within the logic of sensible economy, the material choice was justified. Cream colored Plaskon, carrying black numerals, was used for the disks to provide the utmost in visibility while rigidity of frame and ease of assembly were accomplished by the use of a one piece molded phenol base and a molded phenol pillar plate which hold the electric mechanism firmly in place. The use of molded pieces instantly eliminated much of the insulation which would have been needed in a metal clock.

The movement is available (*Continued on page 71*)

REPOUSSÉ, INLAY, AND LAMINATION

by E. J. Lougee

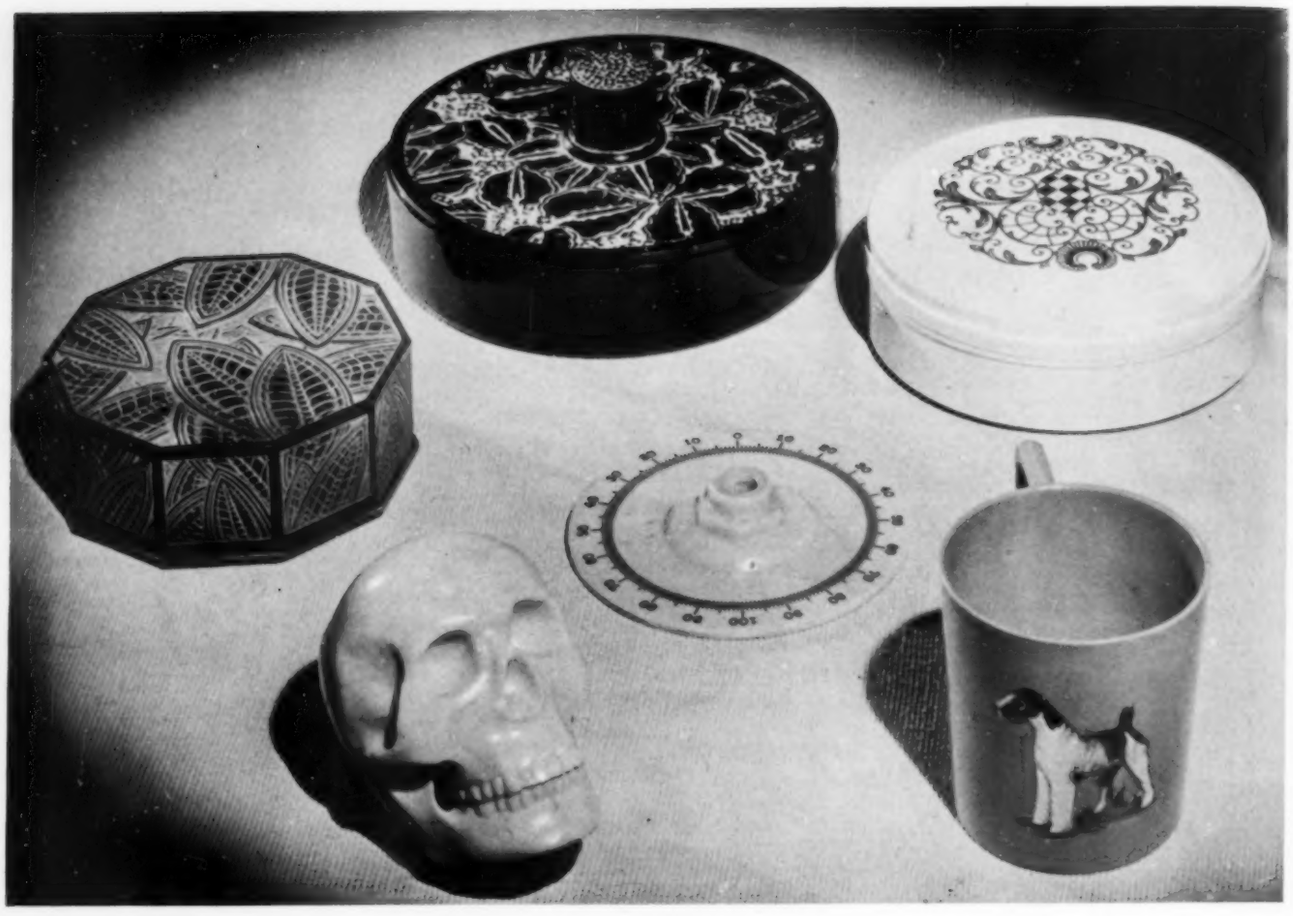
ORNAMENTATION of plastic moldings seems to be limited only by the imagination of the designer and molder who handle it, and there are so many avenues of escape from the ordinary, one cannot help wondering why American designers do not take greater advantage of its possibilities and why more manufacturers who depend upon the moods and whims of a fickle public do not make greater use of plastics.

To glimpse what has already been accomplished by ornamentation, one has but to visit the fifty-seventh floor of the RCA Building in Radio City, New York, where the American Cyanamid Company, through its Beetleware Division, maintain a Little International Exhibit of examples from important molders in Europe and America. R. S. Childs, general manager of the Beetleware Division, extends a cordial invitation to any one interested in plastics to visit this exhibit.

Europe, perhaps, is pointing the way in ornamentation and has created some lovely things, mostly made by hand. But nothing has been done in Europe which American molders cannot do and, with our facilities of mass production and the ingenuity of our industrial designers, this field looks particularly inviting.

Ornamentation is achieved by various methods. One of the most interesting examples is the French repoussé illustrated by two powder boxes, created for Fornells of Paris, one a polygonal shape, the other, round.

The polygonal box is cast from a steel mold which is both carved and split. The bottom of the box is cast plain without embellishment of any sort, and is metal lined by plating with bronze. The inside of the cover top is also plated. The cover of the box appears to be delightfully carved with a leaf design on its top, and the design is repeated at alternating angles on each of its



sides in embossed effect. The box is French blue, over which a gray-green pigment has been rubbed and remains in the crevices in pleasing contrast.

The success of repoussé is determined by the perfection of the carving, or engraving, of the steel mold. No molding can be better than the mold from which it is cast, and its smooth lustre-like surface depends upon the smoothness of the surface of the mold. High grade engraving and chromium plating of the steel insures the best result.

The black French powder box shown is plain and round, and cast from a one-piece mold. It is metal plated inside, and so is the cover. The cover is decorated by a design of leaves in repoussé, and pigment rubbed with the same gray-green. Its tapering knob is a convenient handle which was not difficult to mold.

Another example of French handicraft is illustrated by the white French powder box of metal molded into plastic. The scroll design is stamped or etched from paper-thin metal and centered in the cover mold before casting. This is sometimes imbedded in a slight indentation in the mold, and other times simply laid flat against the surface of the mold, depending upon the molder's desire to have the finished ornamentation appear embossed or flush. The opportunity for reuse packages with the manufacturer's name or crest inlaid in metal suggests itself in this method of decoration. Monograms would be equally effective in this light weight material for tableware. Airways might well adopt such ornamentation for their passenger service planes.

The English marbled cigarette box recently introduced in this country by Dunhill is delightfully modern with its plate glass cover and matching handle of plastic held in place with screws. The bottom of the box is cast in a curve so there are no corners in which cigarettes or tobacco crumbs can hide. It is light in weight, substantial in structure and comes in several colors of mottle to please a wide range of hosts and hostesses who prefer the modern.

The piece with the greatest attraction to the humble eye of your reporter is a German tray of a "delicious" shade of yellow, laminated with cloth or paper on which elephants and jungle trees appear in conventional pattern in shades of red, brown, and mustard. The cloth or paper is first impregnated with plastic and laminated when the tray is molded. This gives a surface of true plastic with all its powers of resistance to alcohol and general wear and, aside from its attractiveness as a well designed piece, it enjoys the distinction of being exceedingly light in weight and easy to handle. This treatment suggests itself for paneled boxes and, with the practically unlimited source of interesting materials which could be employed, the field appears to be wide open to those who would take advantage of it.

While the foregoing specimens are of European origin, American molders have accomplished much with plastics. But with our flair for (*Continued on page 69*)

THE ARCHITECT REVIEWS THE CASE FOR LAMINATED PLASTICS

ARCHITECTURE stepped out of the stone age less than fifty years ago. And having stepped out, it has found itself confronted with more new materials in the last fifty years (and, particularly, in the last fifteen) than in all the ages since the stones of Egypt were piled into the pyramids. Confused by a plethora of new ways of achieving desired ends, architects have been further plagued by a seemingly endless series of new building types required by modern conditions.

From the placid planning of cathedrals and palaces the architect has been hurled into the machine age problems of the office building, the radio station, the mechanized home and the air conditioned theatre. He has been forced to become more than a mere decorator. He has taken on some of the functions of the engineer, dealing with problems of heating, ventilating, air-conditioning, acoustics and a multitude of other factors which, by their very nature, never confronted the architect of an earlier era.

It is but natural that, between new problems and new ways of achieving their solution, various schools of thought should arise. It is in fact remarkable that, in so short a period, most of those varied theories should have been so quickly synthesized into what the man in the street calls Modernism.

Such Modernism is not to be confused with the cheap and the tawdry imitations which have followed the introduction of this, as of every new style. One must remember that every school of architecture has had its honest practitioners and its flock of imitators. Among those of the modern school, the line of demarcation is easily discernable because of the very nature of the theory behind modern architectural design.

Modernism is, in one sense, a confession of the impossibility and the futility of following the traditions of the past in constructing buildings which, in materials used, in manner of construction and in purpose bear no relation to the past. Looked at from a more positive angle, Modernism is the intelligent use of those materials which will best accomplish the functions for which the building is erected, in a manner which does not seek to hide either material or function but rather utilize both to achieve attractive results.

It so happens that laminated plastics lend themselves particularly well to the purposes of the architect who designs in the modern style. He uses them, not as substitutes, not as imitations of other materials—but as "true" materials, needing no camouflage. He says in effect, "I have not used wood here or marble there because the function of this particular portion of my building cannot be perfectly fulfilled by these materials. I have instead used another material—a laminated plastic, if you please—because, by its very nature, it more adequately serves my ends. Having used it, I will be honest about it. I will not hide it under paint or veneer, but will rather capitalize its own peculiar properties to achieve an effect as real as that of the real stones in a real stone building!"

It is true that there are many instances in which laminated materials are logically used in which it is desirable to disguise their surfaces. But the modern trend avoids such uses except in such cases where particular conditions make them imperative.

ROBERT HELLER

Since his graduation from Princeton and a subsequent period of study in France, Germany and Austria, Mr. Heller has done an immense and immensely varied amount of work in fields of architecture, interior decoration, furniture design and industrial design. Under Ely Jagues Kahn he has designed offices for E. R. Squibb and Sons, interiors in the new Bonwit Teller store and the Fifth Avenue Salons of Richard Hudnut. He has designed the homes of Roger Wolfe Kahn, A. H. Woods and Sam H. Harris, Stations WCAU in Philadelphia and WJAR in Providence, and has done a number of stage designs for plays produced by Gilbert Miller. He is, at present completing plans for another radio station, to be erected in New York City and will shortly leave for the coast to design sets for several forthcoming motion pictures. A number of his furniture designs, several of which utilize laminated plastics, have also achieved both critical acclaim and commercial success

Among the large groups of architects who have become known for their successful work in the utilization of new materials along modern lines is Robert Heller, six examples of whose work are shown on the following pages. Mr. Heller has analyzed his reasons for the choice of laminated plastics in each instance not only from the purely architectural viewpoint—but as a good modernist—from the point of view of the serviceability of plastics in each case, their comparative cost and their suitability when used in conjunction with other materials. The illustrations, and Mr. Heller's notations thereto, speak for themselves—and for the character of the architect as well. They constitute the first of what will become a long and varied series, by architects, interior decorators and builders, recording, through actual case histories, the growing use of laminated plastics and analyzing the reasons for this growth in favor as a guide for others entering upon the utilization of wide number of materials in the plastics category.

MAN'S BEDROOM, PARK AVENUE, NEW YORK CITY

This photograph illustrates an essentially decorative use of laminated plastics in interior architecture. The problem was to match the wall color on the two doors flanking the mirror with a material which, in texture, was in contrast to the painted plaster wall surface and which, at the same time complimented the texture of the one-quarter inch plate mirror.

A dull lacquer finish which was originally considered was abandoned because the cost of veneering a sheet of laminated plastic material to a flush wood door was not greater than the application of a fine hand-rubbed lacquer finish. At the same time it was believed the choice was more durable and permanent.

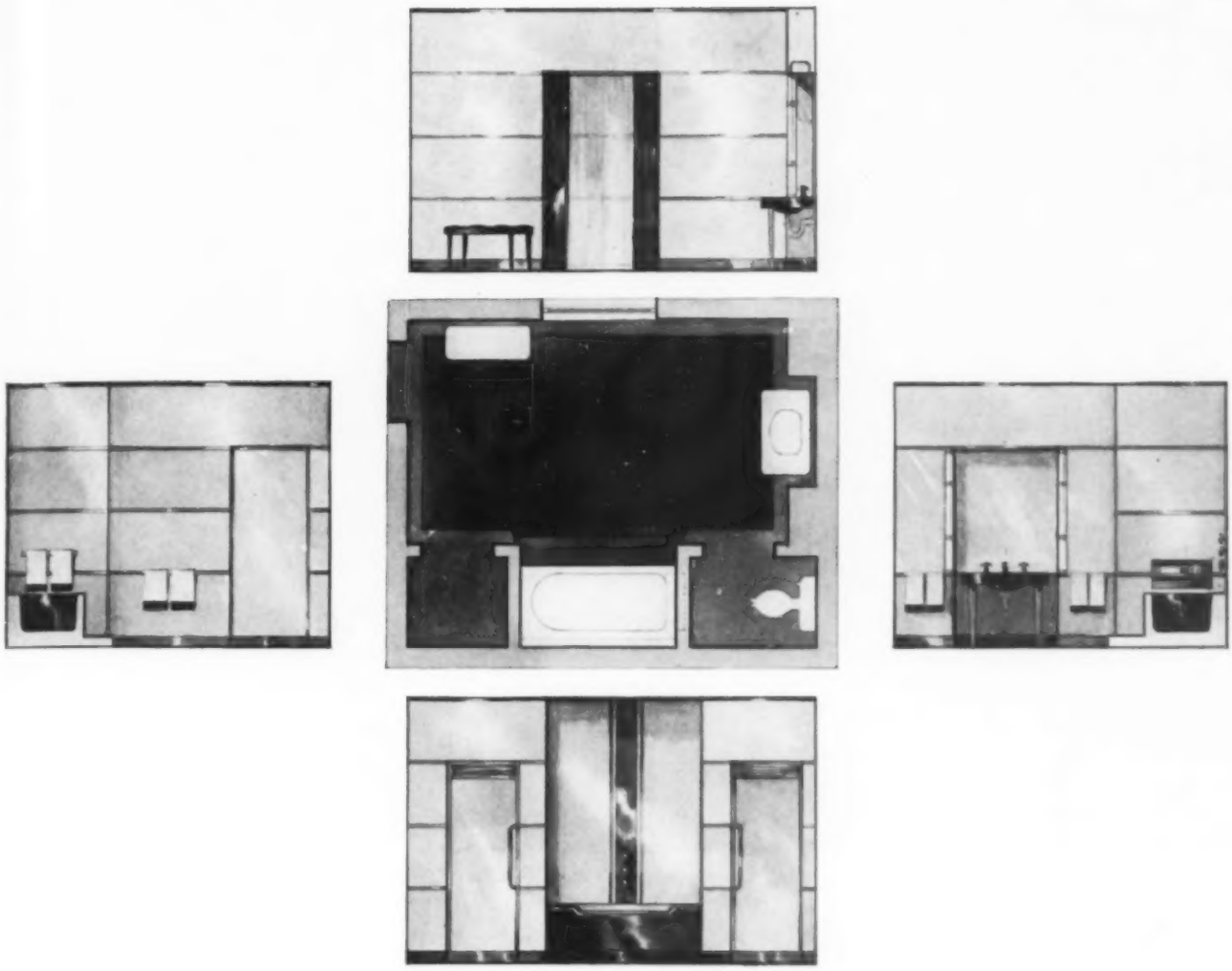
It is interesting to note that the door handle escutcheons were made of a contrasting color of the same material which was inlaid at the time of application.

The walls and doors are a soft off-white color and the escutcheons in deep chocolate brown recall the color of the wood used for furniture and of the coverings which are all in shades of brown.

BEDROOM APARTMENT OF SAM H. HARRIS, NEW YORK CITY

In the bedroom here shown two large radiator enclosures, of which one is illustrated, were required.

On a previous similar occasion the wooden enclosures used proved unsatisfactory due to (1) shrinkage and opening of joints due to extreme temperatures and (2) necessity for lining with asbestos and metal because of the heat. By the use of laminated plastics mounted on asbestos cores we found all the above objections economically overcome and a highly decorative effect was, as well, obtained.



BATHROOM, DESIGNED FOR RESIDENCE OF SAMUEL PALEY, ESQ.

The accompanying drawings show one of four bathrooms, designed for the new residence of Samuel Paley, Esq., in Chestnut Hill, Pa. The house was built in 1914 and extensive alterations which have just been completed were deemed necessary in order to modernize the house according to present day standards.

In the scheme shown the walls are faced with plastic panels laminated to asbestos cores and mounted by means of screwing to horizontal furring strips embedded in the brown scratch plaster. The horizontal joints are concealed by inset flush strips of the same material.

The panels are of soft grey laminated plastics while the strips, of the same material, are of a contrasting dull maroon color. The fixtures chosen for this room are all of black as is the major portion of the tiled floor. Tub and lavatory fittings of special design are executed in black Lamicoid.

On analysis it is found that the cost of this bathroom in comparison to two others in the same residence executed in hand-made faience tile is 25% less. A third bathroom designed in glass with metal trim was 10% more expensive than the one illustrated.

It is the designer's firm conviction that the scheme of this bathroom, utilizing plastic material, while considerably less expensive than the usual tiled bathroom, is decoratively more pleasing than either glass or tile. Moreover, the material, being readily adapted to the architectural problem and easily handled on the job at the time of erection, is highly suitable to adoption for standard bathroom design.

RECEPTION ROOM, RADIO STATION WCAU, PHILADELPHIA

The reception room shown in the accompanying photograph is in the WCAU building, Philadelphia. In this particular instance the management had emphasized the absolute necessity for a decorative scheme which would stand excessive wear and tear and some misuse by a large percentage of the several hundred daily visitors to the studios.

We came to the conclusion that the material used for wall surfacing would have to be one which (1) could be readily washed and cleaned without affecting its color or texture; (2) that would not easily be marred or damaged if accidentally struck; (3) that was fireproof; and (4) that was inexpensive and practical to erect and which was also adaptable to a decorative scheme.

Previously a number of other schemes had been considered such as wood paneling, a treatment combining leather and photo-murals, a treatment utilizing mirrors and one which was considered most seriously was a combination of fabrikoid wall surfacing with wooden strips. The last scheme was the least expensive but the Formica use of laminated plastic sheets proved to be only about 20 per cent more expensive and was, quite naturally, of a more permanent nature. The plastic scheme was, incidentally, less expensive by from 15 per cent to 50 per cent than any of the other schemes submitted.

Laminated plastic on an asbestos backing rendered moisture-proof before erection was specified. This was necessary because the schedule of completion would not allow for waiting until the rough plaster was thoroughly dry before erection.

The material chosen was manufactured in special shades of red and black to become part of the red, black and grey scheme selected and decided upon by the architects. The colors were matched to specially prepared samples which were also given to the flooring and furniture covering manufacturers.

Telephone booth doors and walls were also lined out with this material and successfully overcame the usual objection of writing on walls which, in this case, is readily removed by washing.

The material was attached to flush wood furring strips by means of invisible clips. The surface joints are all flush with no moldings necessary at the joints, this giving the trim and modern effect desired by the architect.

It is interesting to note that the clock face was made of the same material with chromium mounts indicating the numerals and becomes an integral part of the decorative whole. The tables and loud speaker cabinet are made of the same material.

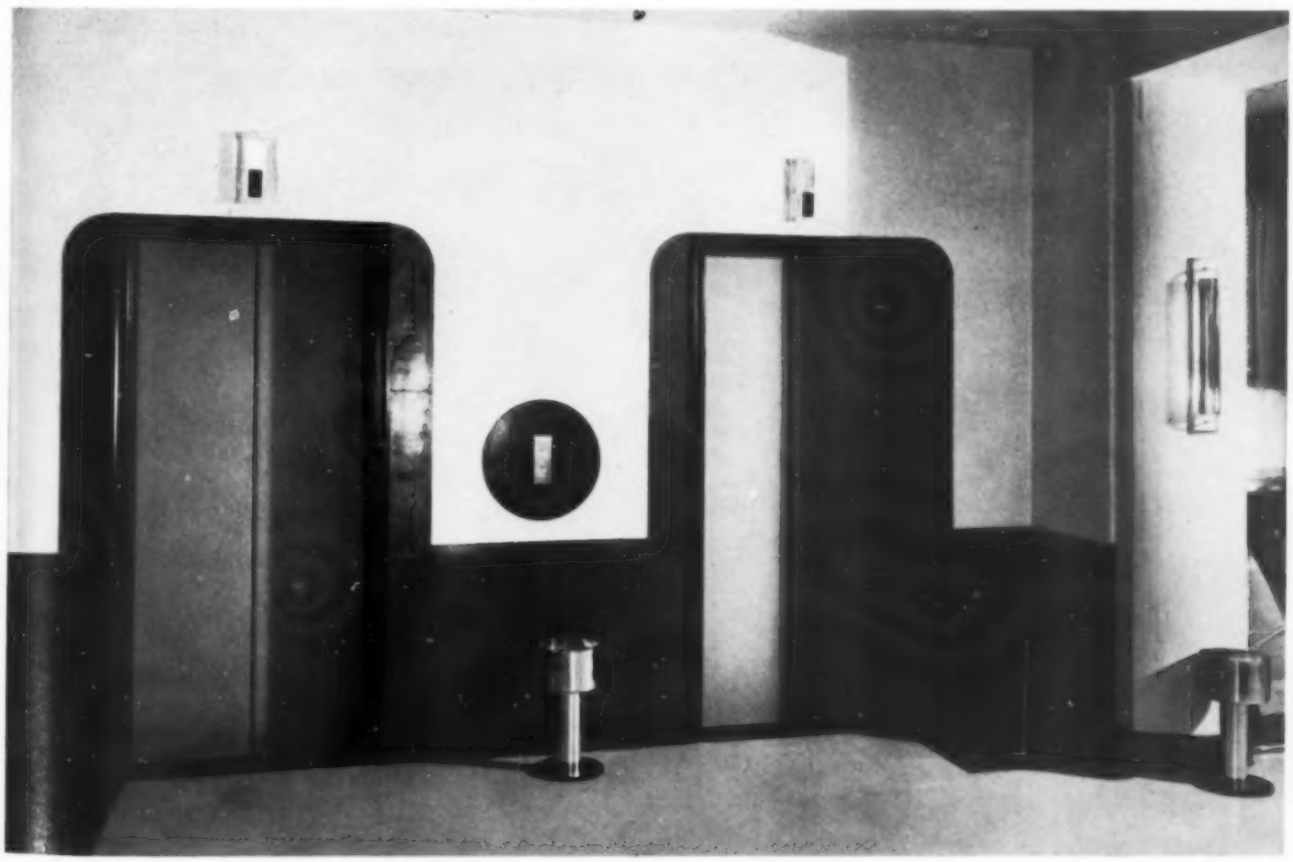
RECEPTION LOBBY. WHOLESALE DRESS SHOWROOMS, N. Y. C.

The counter front as well as top and doors in this lobby were made of a laminated veneer. Due to the character of the material it was a simple matter to attach the sheet to a circular metal frame of large radius. The visible screws holding this sheet were concealed by the Formica base and overlapping counter top which was made of Formica veneered to a seven-eighth inch wood core. The colors of the material used, blue and grey, were to order to match samples submitted.

ELEVATOR LOBBY. PHILADELPHIA OFFICE BUILDING

Economy prohibited the use of ornamental metal doors and it was therefore found practical and expedient to obtain the required decorative effect by the application of Formica sheets to the rough unfinished doors by means of thin metal beading strips attached around the edges of these doors. Furthermore, the material being readily cleaned contributes to the reduction of building maintenance expense.

It is interesting to note that a decorative piece of laminated plastics was used as an escutcheon around the push buttons on all floors to prevent finger marking and soiling of the painted wall surface; the trim around the doors was installed for the same purpose.



PHENOLIC BEARINGS SOLVE DIFFICULT PROBLEMS

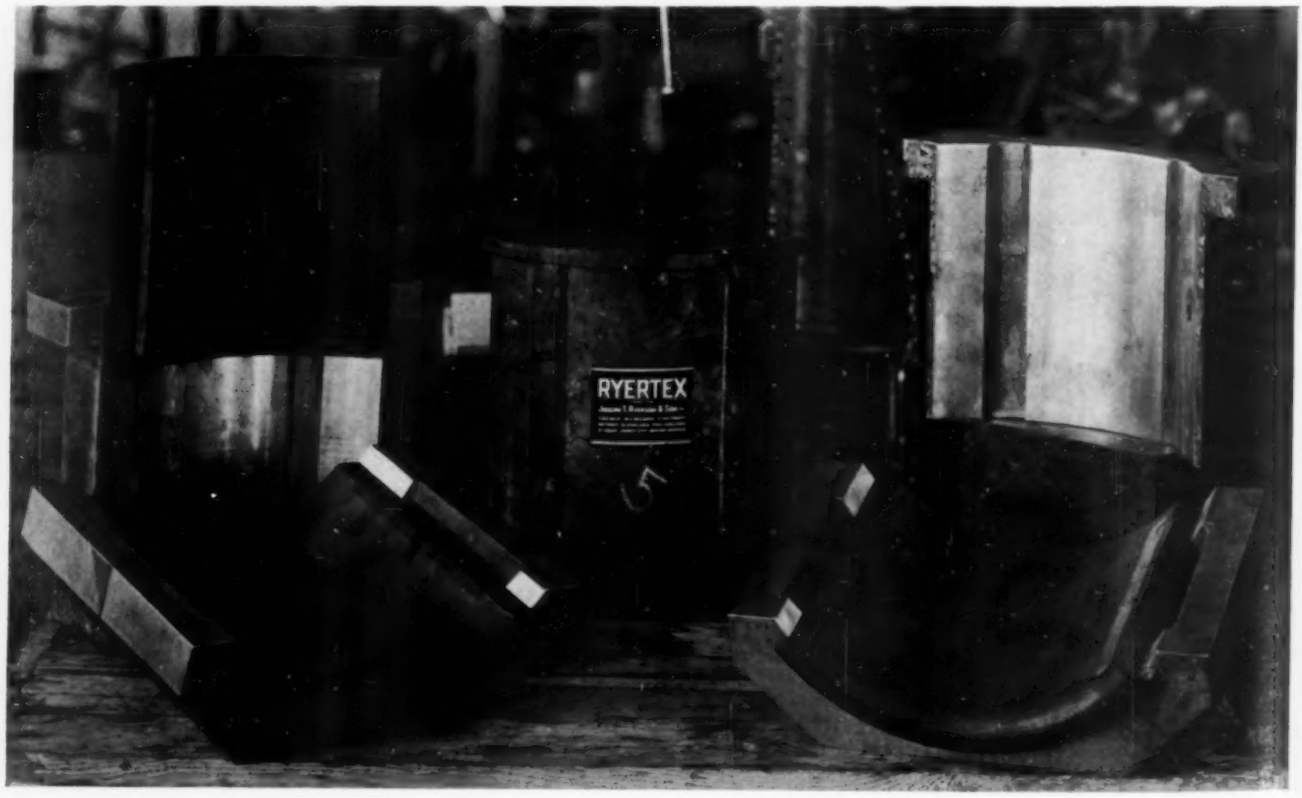
IN the bearing field, as well as in many other applications, plastics have successfully displaced metal or wood or both. This is partly because plastics are not subject to corrosion and are highly resistant to moisture and to many chemical reactions that affect other materials. In the case of bearings, lubrication is simplified and friction is reduced. In addition, life has been increased as much as tenfold in some instances, according to evidence collected by at least one maker of such bearings. Yet there is relatively little difference in cost as between the plastic bearing and one of such metals as bronze and babbitt, the commonly used plain bearing metals.

Bottom bearing for a 40-inch blooming mill, showing the Ryertex phenolic-impregnated liner and thrust collar. This bearing is 22 in. inside diameter and is designed for water lubrication

Plastic bearings are made by impregnating canvas belting or some very similar material with the proper type of phenolic compound, sometimes containing graphite, and then curing the impregnated material under heat and heavy pressure, such as is exerted in making other molded and laminated products. The resulting product is very hard and smooth and is also highly resistant to attack by moisture and other influences that affect some types of bearing. Phenolic bearings, even when lubricated with water only, as is often the case, absorb from about one-third to one-half as much power in friction as the equivalent oil-lubricated metal bearing. Wear is also much less rapid, hence adjustments of the bearing and replacements are much less frequent.

These facts account for the extensive use of phenolic bearings in steel mills in nearly all parts of the world where steel is produced, particularly where, as in roll necks, pressures are heavy and water for cooling rolls is likely to get into the lubricant if oil or grease is employed, as it must be with metal bearings. With the phenolic bearing, water serves as a good lubricant and helps to keep the bearing cool. Oil or grease can be employed, as with most other plain bearings, if preferred, and of course is better than water for applications in which water, if used, would rust the shaft and perhaps other steel or iron parts. When water is the only lubricant, it should not be allowed to stand for (*Continued on page 68*)

Ryertex phenolic-impregnated bearings for use in a 2-Hi Lewis mill used in rolling brass. The back face of the bearing in the center shows external keys to prevent the shell from turning in the chuck in which it is seated



PLASTICS AS FUNDAMENTAL MATERIALS

An interview with Henry Dreyfuss

by E. J. Lougee

"PLASTICS as fundamental materials have sufficient comparative advantages with other materials to indicate an illimitable future with proper development," says Henry Dreyfuss, Industrial Designer. "Their great advantage lies in the fact that they *are* fundamental materials, and as such are available in sheets, extruded forms, and with the use of molds, there is no limit to the shapes in which they may be cast.

"Another advantage is that when a plastic form comes from the mold, it is practically finished and ready for use. It requires neither treating nor lacquering, and its natural finish is smooth, sanitary and permanent because it is not an applied finish."

Mr. Dreyfuss believes that the tensile strength of plastics will eventually be increased to a point where, with proper reinforcement, automobile bodies, telephone booths, refrigerators, washing machines and bathroom equipment including bath tubs, may be successfully molded with a resultant saving in assembly and finishing costs which will more than offset the cost of molds. Uses already made of plastics in the insulating and radio field give credence to the thought, but it remains for the manufacturers of plastics to develop the strength of their materials and make them impervious to moisture to a point where such uses will be practical.

Control of molds to handle difficult shapes has already been demonstrated and, while molds are unquestionably expensive, there are many occasions where this expense can be equalized by proper planning and design. Returning for a moment to the refrigerator for example. The fundamental construction of a refrigerator may be likened to two boxes of different sizes, one within the other, with insulation between. They are usually made from metal, stamped in several pieces, assembled, welded, treated in various steps, enameled outside and porcelain lined.

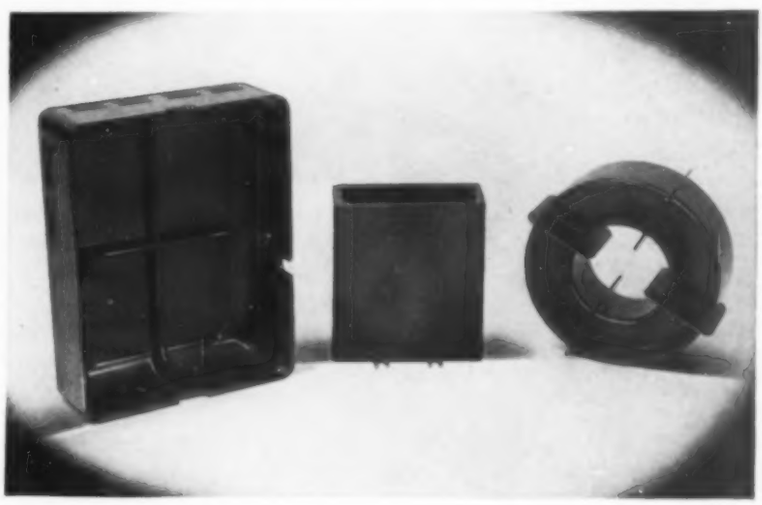
Now when plastics have been developed to a degree which makes such use feasible, there is no reason to believe that refrigerators cannot be cast or molded completely from plastics and assembled in one tenth the time now required. The finish would be clean, sanitary, and free from cracks, and its self contained insulating qualities would be of further benefit to the unit as a whole. No lacquering would be necessary, nor would there be any need for porcelain lining.

It is unfortunate for its future that plastics began its career as a substitute material and has been used mainly in small items of low price. This has naturally created a prejudice against it as a material with intrinsic value of its own. It is not hard to understand the hesitancy of a manufacturer to use plastics as a fundamental material in the manufacture of an expensive item so long as the public is encouraged to associate the material with kettle knobs and other gadgets displayed in the five-and-ten-cent stores.

It is definitely up to the makers of plastics to elevate their material in public appreciation much as the steel manufacturers have done with steel. It was not so long ago when no self-respecting executive would entertain the thought of a steel desk in his office. Although they had many advantages, and a longer life than wood desks and files, steel desks so long as they imitated wood grains and attempted to serve as a substitute material remained unpopular. Recently steels have asserted themselves as fundamental materials and their use has been definitely accepted as practical and desirable. This has been recently demonstrated in the streamlined trains of the Burlington Railroad, and elsewhere, where much of the interior finish is steel.

The makers of Monel Metal have pointed the way to what may be accomplished. They have taken a fundamental material which in itself is uninteresting and developed it to practical uses where it stands supreme, even in the commonplace utility of an ordinary kitchen sink.

Walter Chrysler, through his introduction of Airflow design, has attracted the attention of the whole world to Chrysler and De Soto cars. No amount of advertising or publicity for his former cars could have



Cover for small subscriber's set, non-magnetic coil case, and coil core, all phenol plastic parts

HENRY DREYFUSS

If most men at fifty could point at a record of achievement as outstanding and momentous as that which has been rolled up by Henry Dreyfuss at the age of thirty, they would feel they had lived full and useful lives.

Some of his best known work includes the G. E. Flat Top Electric Refrigerator, and the redesign of the Monitor Top; the coal and oil Space Heaters, and the Toperator Electric Washer for Sears, Roebuck & Company, which was the first washing machine to appear with all its controls on a top panel within easy reach of the operator.

Mr. Dreyfuss has done notable work for Western Clock Co., including redesign of Big and Baby Ben clocks and Pocket Ben watch and their packages, as well as consulting on the rest of their entire line. He is consultant for Bell Laboratories, and for McCall's Magazine, which he designs each month and assumes responsibility for its physical appearance. He has just completed the interior of a Douglas Transport plane with lounge, lavatory, kitchen, and conference room, which will serve as a sky office and means of rapid transportation for its new owner.

Mr. Dreyfuss is one of the five most active industrial designers in this country.

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brought forth so many "Ah's" and "Oh's" of astonishment and admiration as have greeted the Airflow wherever it has appeared.

The eventual value of such theatrics cannot be measured by immediate returns through sales. Pioneering seldom pays with swift profit, but outstanding initiative earns a recognition which may be accomplished in no other way. New thoughts are released and new ideas get under way which may break down prejudice and mark the beginning of a long period of forward development which is bound to react favorably upon those with the courage to take progressive steps.

Some leader in the industry will no doubt step forth with a striking and extraordinary use of plastics in the near future which will do much to reduce this prejudice against it as a decorative and fundamental material and then manufacturers in many lines of industry will be faced with the decision of including plastics in the group of available materials from which to choose.

Mr. Dreyfuss' industrial designs have been largely mechanical where no great use of plastics in its present development has been practical. Yet wherever possible he has taken full advantage of plastics' decorative value as evidenced in the illustration of the electric washer, designed for the Associated Merchandising Corporation, a group of department stores throughout the country.

The Todd Protectograph, designed by Mr. Dreyfuss, has square keys of plastics, chosen for their delightfully smooth finish and splendid wearing qualities.

Mr. Dreyfuss, who is consultant for the Bell Laboratories, points to the telephone as the perfect example of the present use of plastics. The Bell System handset is made of phenol plastics which allows the electrical conductors and inserts for mounting the instruments to be molded in it.

The engineering design of the handle for this handset presented some unique problems. One of the most be-

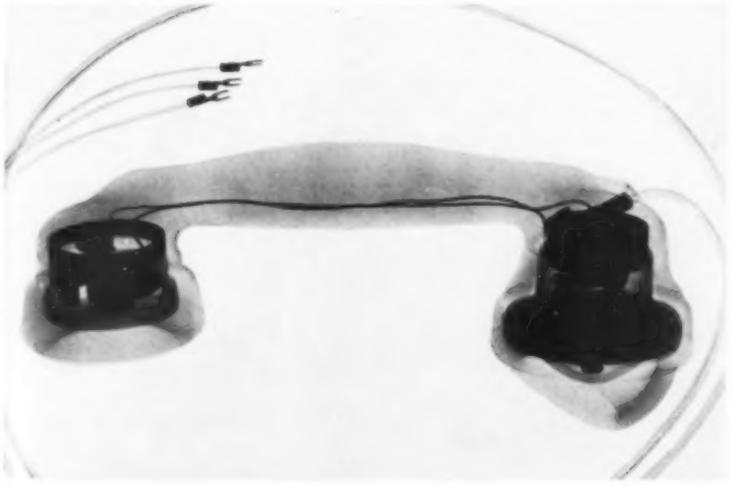
Artist's drawing showing cross-section of Bell System Handset

The dark red plastic control knobs on the Associated Mercantile Corporation electric washer serve a dual capacity. They instantly identify themselves and their location for emergency, and form the sole decorative motif in pleasing contrast with the cream color of the tub and the black cover and base with its chromium bands and wringer

deviling was the fact that the distance from the human ear to the lips varies greatly in the individual and at the time of its development there were no available data on the subject. This matter of distance which the voice must travel before it enters the transmitter is of paramount importance to the successful use of the set, and in order to determine the average distance from ear to lips a special gage was constructed and more than four thousand heads were measured for distance, as well as for the proper curve of the handle to prevent the hand from coming in contact with the cheek when in use.

Another of the chief obstacles in designing the handset was likelihood of "howling" which occurs at frequencies at which receiver and transmitter resonate. To avoid this, the handle was designed to have a high resonant frequency, and to provide an inefficient medium for the transmission of mechanical vibration in the frequency range where the instruments respond most readily.

Familiar handset parts of phenol plastic. All except the handle have molded threads



Considerable attention has also been given to its appearance and to the problems associated with its production. The triangular cross-section with rounded corners make it comfortable to hold in the hand and requires little effort of the user to prevent turning.

Plastic material was chosen for its production to make the handset light and easy to hold, and not cold to the touch as metal might be. Because it is a good insulator, the electrical conductors and inserts for mounting the instruments could be molded into it, saving assembly and finishing operations. Its lustrous black finish goes all the way through rather than being applied only to the surface which makes it definitely permanent.

Efficiency of equipment is never sacrificed for economy in the Bell Laboratories, but wherever the two can be combined, it is quickly done. The cover for the new small subscriber set, which is illustrated with the nonmagnetic coil case and coil core, gives a common example of efficiency combined with economy. Nine operations were required to produce the old metal cover; blanking, forming, trimming, grinding, sand-blasting, phosphate finishing, scratch brushing, japanning, and baking. Three oper- (*Continued on page 67*)

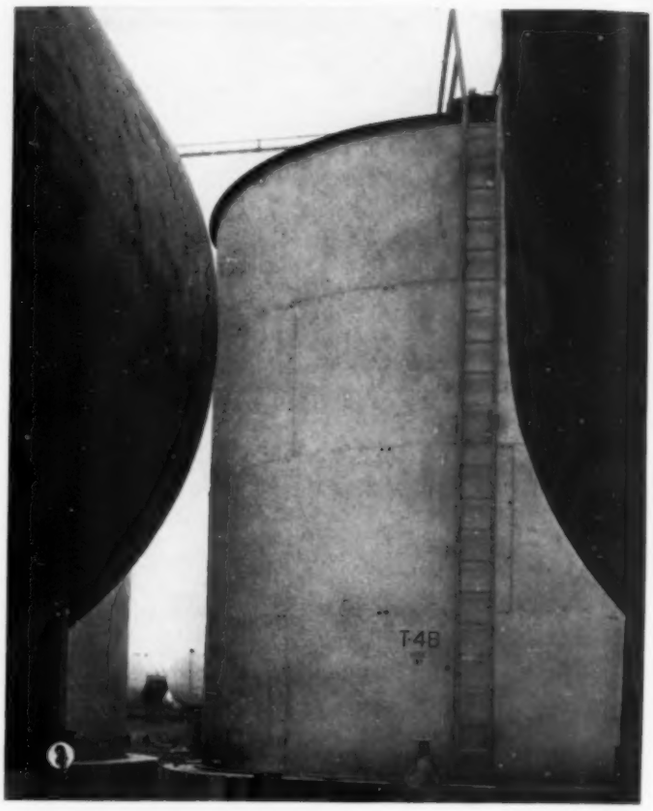
X-ray photograph of actual handset showing wired connections

MIRACLE IN FOUR ACTS

General Plastics' Durez: Story of a Mill that's always Grinding, a Product that's always Hunting New Uses, and a Man that's always Moving

IN CASE you aren't familiar with maps of Western New York, North Tonawanda is a small town on the Niagara frontier, noted chiefly for being the western terminal of the Erie Canal and for once having been the world's largest lumber city. Sprawled out over isolated fields on the outskirts of the town, General Plastics' brick-and-glass buildings are a good example of the type of chemical process plant nurtured by America's Chemical Age. After a stormy childhood in the World War, Chemistry settled down to a more peaceful period in the decade immediately following, during which one of its most notable offsprings, phenol plastics, began to make itself felt. In 1924, when Durez came into being, molding compounds were selling for five times their present price, took 15 minutes to cure in the mold (now 3 minutes) and were pretty erratic as compared with today's uniform products.

Many machines: Few hands: The mill: Today's General Plastics is not a gigantic plant by any means, its sizable production trick being accomplished not with mirrors but by keeping the factory running twenty-four hours a day and using mechanical means of processing. Over 80 per cent of its output—used to make telephones, ignition parts, bottle caps, radio tube bases, electrical parts, cameras—goes out in carload lots, the most economical and convenient production unit now possible. Capitalized at around a million dollars, the company has outgrown its plant and offices several times, has made money during every year of its brief history—despite collapsing motor-car and radio markets, general industrial slump and tobogganing prices. For a year or so before 1926 it was called the Durez Company, at which time expansion, reorganization and corporate law changed its outlook to bright and its name to General Plastics, Incorporated, at the same time permitting it to enter into the manufacture of some sixty-odd other phenolic resin off-shoots, which



(2) On Draught: Storage tanks connected with pump-house and plant by underground pipe lines await call to disgorge. Calling is done by opening cocks in the many-valved header in the plant near the tank-scales, on which each kettle charge of chemicals is weighed, not measured. Kettles are really indoor tanks like these, steam-jacketed and with agitator blades inside, in which the chemicals are heated under vacuum to that magic temperature where chemicals and catalyst (Mr. X) all change their spots. From here on, one speaks of the stuff as a solid, a synthetic resin. The first act is over.

(1) Prologue: Enter the Chemicals. Tank cars are the only visitors that don't need passes to the Durez yards. Every year through this slender pipe pass enough liquid chemicals to disinfect every hospital in America... the makings for less than 20% of the country's phenolic molding compound. After testing to check its special characteristics, if any, the phenol or formaldehyde, or whatever it may be, starts through the pump-house (left) on its last journey.

go into thousands of other manufactured articles, from brake-linings to wall-coverings.

When factories grow as fast as General Plastics in so short a time they rarely look planned; most often they reflect the frenzied *laissez-faire* age in which they sprouted. General Plastics is no exception, in that it has almost as many roofs as chemists. As this is being written, still another addition, a three-story molding compound and blending unit, is being fitted into the masonry jigsaw.

But whether it looks planned or not, the plant is quite efficient. If you want to bother to check the tonnage of incoming raw material with the tonnage of outgoing drums, you'll find that only about 2 per cent of the theoretical 100 per cent output is lost during its conversion from raw fluid chemicals to molding powder. Most of this 2 per cent escapes in the form of evaporation during processing, elimination of volatile impurities and dust carried out in workmen's trouser-cuffs. The 2 per cent loss rarely varies.

A flow chart of this conversion process is a tortuous affair and the lay reader can thank the company executives for not permitting its technical description here. Only a person familiar with the details of synthetic resin production can follow the path of the various ingredients as they are pumped, vacuumed, blown, shunted, piped and conveyed from underground to rooftop and back again, east then west through heat and cold, up walls and through cyclones, through grinders, sifters, blenders. During all this, few humans see it or handle it. This automatic control of materials is one of the company's most important contributions to

(4) Overture in Noise: Grinders. The action speeds up from here on as the grinders—to a bass-drum accompaniment—reduce the resin to a powder so fine that it bubbles in the hoppers like water. Fans carry it through tubes to the top floors through cyclones—gadgets that calm its agitation—through sifters, through more tubes, through hoppers. Here pigments, fillers and miscellaneous ingredients join it, and it is now fast becoming a molding compound, lacking mainly homogeneity and a few other requisites. That's the next act.

(3) The Plot Has Thickened: Resin comes from the kettle in proverbial molasses-in-January form, spreading a thick sea over steel forms. It cools quickly, becomes brittle, whereupon it's broken into chunks like modernistic melons (foreground) and goes gaily and dustily to the grinders.

synthetic resin production, together with the uniformity its large-scale production naturally brings and the exact control of chemical reactions which it developed.

From the photo-record of the process accompanying these lines, the reader may see that only parts of it are of a chemical nature and the rest is a mechanical problem. Continuous large-scale production of any modern material always involves problems of mechanics, far more interesting to the layman than the more important chemical process which goes on quietly right under one's nose, and at the same time requiring more investment in time and money than the perfecting of the product in the beginning. Probably this is the underlying reason for America's present-day love of Bigness, and why the decline of the small business man is so well-publicized a problem. Bigness is becoming an economic necessity.

As far as interest is concerned, the most dramatic thing in the whole General Plastics' process is the noise, and that doesn't show in the photo-record given here. The product is seen only at rare intervals—no white-hot ingots, no glowing sheets or ribbons to inspire awe, no sweating, goggled hunkies. Just noise, an occasional operator or white-collared super, more machines and still more noise. One hundred and twenty unbroken hours a week of Noise.

(5) Reductio ad Absurdum: What looks like hopeless retrogression here is really progression: putting the powder through hot mangles establishes its molding characteristics and thoroughly mixes the ingredients, even if these wrinkled rubbery shreds look like refuse. Here is the ticklish stage: runners pick up samples of the shreds several times an hour, control room men test it to see if its molding qualities jibe with the specifications set. Another set of grinders return it to powder-form, conveyors take it upstairs, through grading screens, over magnets to remove uninvited ferreous guests and dump it into the twenty-ton blenders.

(6) Journey's End: Feeding time for one hundred and thirty-three drums peacefully ends the biography of a carload of molding compound. Overhead in the blender-hoppers are some forty thousand pounds—each cubic foot of which is tossed and turned till it matches the next. Filling the shipping drums is not a continual process for the bull-gang, but the conveyors that fill the blenders have never heard of forty-hour weeks. The epilogue consists of telephones and thermometers, rouge boxes and radios.

(7) Chief Miracle-maker: Harry Mason Dent.

New uses: The product: What accidents are to lawyers, new applications are to General Plastics. Long ago the company saw the folly at squabbling with competitors over existing outlets and started educational efforts on industry to increase the number and size of uses. With a product that molds into a tough infusible piece of almost any shape; dielectrically strong, water-, oil-, heat- and chemical-proof; colorful and shiny, this doesn't sound difficult. But the question has two sides. Eight or nine years ago, in the company's early days, radio dials and tube-bases were important consumers. Then radio dials started shrinking in size and number, as did radio tubes, so another large use had to be sought to replace it. Auto-ignition parts, distributor caps, coil covers proved to be the replacer and still are a major market. Wiring device consumption may level off slightly with the swing to soft rubber plugs, but utensil and appliance parts will more than balance it. Molded jar caps are giving ground to metal imitations, but liquor caps and molded jars will increase the total much more. Small-machine parts gather up the slack left by the ailing clock market. And during this market-expansion, the company found itself mothering 147 different materials today as against the original one.

New markets usually follow automatically when a leading member goes to plastics and does it right, the difficulty being in getting ingrown officials to pioneer, due to their unfamiliarity in handling plastics and the gamble on sizable tooling-up costs. Door knobs, calculating machine cases and other office appliances are examples of logical markets yet to be corralled. In spite of the obstacles, General Plastics' production curve goes up in the same direction as total U. S. consumption, only at a steeper angle.

Growing pains still hamper the plastics industry. Too many molders still ask for imitation walnut powders, too many poor product designs seem to require something of the sort, and too many product designers think of plastics as substitutes. To quote a classic example: a few years ago Poole Clock Co., battery clock pioneers, found that General Plastics' Durez made pre-finished clock-cases in one piece considerably cheaper than their cabinet-makers could. With a rush worthy of the Forty-niners, trade molders swarmed in on electric-clock manufacturers, grabbed their wood clock cases, took them home, molded duplicates in walnut and mahogany plastics and got some sizable orders for their trouble. But it was over as quickly as it started. Consumers rebelled at the flood of imitation wood clocks, clock manufacturers rebelled at molders, and the molders are gradually rebelling at wood effects. Result: a good market still lying in a coma, whereas if nursed more carefully it would still be consuming five carloads a month. Which is why the newly discovered industrial artist has found himself banqueted, boosted and ballyhooed by the plastics industry during the last year or two, for he alone seems to be able to

(8) Dent's Hobby: Eight play-rooms for chemists and only seven for office non-productives show a healthy technological emphasis. Manned mostly by recent-collegians, these counters have given birth to some really notable improvements in molding compounds and new industrial uses for phenolic resins.

bring out the real beauty inherent in every pound of powder.

Regardless of these pains, optimists on the outside speak of a coming Plastics Age rivalling the Steel and Alloy Age, wherein practically the whole country will be molded. Realists on the inside say very little—they know more intimately the problems, lack of distribution organization, narrow profit margins, unnecessary competitive wastes, raw material problems and structural limitations of the organic ingredients now used. Both are probably right.

Stranger to the kids: The man: One time, in the early days at General Plastics, a six-foot-three Italian workman walked up to the foreman and asked for his time. "What's the matter?" asked the foreman. "I quit," said the workman. "Don't you like working on the night-shift?" the foreman asked. "Oh, that's all right," the giant answered. "It's that guy workin' here with me. I no work no more with little curly-hair' fella. He go like hell all the time."

The little curly-hair' fella was Harry Mason Dent, chemist, story-teller and president of General Plastics. From a salesman of molding-powder by day and maker of molding-powder by night, Harry Dent has changed little in this last full decade (except to follow his Italian workman in quitting the night-shift) and is today the exact opposite of the American Executive as Hollywood shows him. His office in the company administration building is twice the size of any of the others, but 80 per cent of the time it's uninhabited. His phone girls get gray-haired: most of his telephone calls catch him in the plant, laboratory, a hotel or branch office.

Perhaps it's the small scale on which the company started that makes Dent today a believer in almost anything—if it comes big enough. Years ago when a drum order of powder got preference over all incoming calls, he was talking carloads and preaching uniformity, the lack of which was then a serious obstacle. Today customers who know him better wait for weeks so that a more-than-one-carload order can be handed to him personally. Likewise his early experience with a Model T Ford, in which he used to drive from Buffalo to New York in nine hours, probably explains his present weakness for the longest wheel-bases Cadillac or Lincoln can offer. But his perspective doesn't change, as with some men, in indirect proportion to the size of their plants. Let it be recorded that there were no layoffs or pay-cuts at General Plastics all through the dark days of the recent depression.

Throughout the company's entire history, Dent was realistic enough to know that big volume meant lower prices, or vice versa, and naturally reduced profits. At any rate, the equanimity with which he has met the numerous price reductions—some seemingly ruinous—in the last few years, has been interpreted variously as just plain realism, a curious kink that refuses to take anything seriously and the famous Dent poker-face. Poker-faces are valuable assets in a business where over-enthusiastic outsiders urge the investigation of some queer markets—from molded freight-cars to plastic pianos.

(9) Thirty-one uses today will be thirty-two tomorrow. Users of Durez have most catholic taste in what they make from it. And, strangely enough, the company takes a peculiar interest in the results—even after it's paid for—claiming they never had too many samples to show industry how versatile the stuff is.

CHECK YOUR PRODUCT FOR ADDITIONAL USE-FEATURES

The Iron and Toaster Were Perfected. . . until This Manufacturer Proved That New Features Could Take His Products Out of Competition into a Field of Their Own.

THE electric iron is a simple instrument. Convenience governs its shape, common sense designs its handle, convention stands it on end when momentarily out of use. Oh yes, there's not much you can do with an electric iron. It's just a straight price proposition.

Take the toaster. It's either automatic or it's not. But any way you slice your bread, it's still a toaster.

The inarticulate public didn't demand anything more than manufacturers were ready to offer them, in either case. And the manufacturers, with a few shining exceptions, haven't worried too much about something that there wasn't much demand for in the first place.

That was the situation confronting the Proctor and Schwartz Electric Co. when they considered re-designing their toaster and iron. They could, if they wished, have taken the easy road . . . made a slight change here and there . . . saved a bit on costs and produced a thoroughly presentable (and thoroughly un-distinguished) pair of household appliances.

They took the harder road. Designed their products from the ground up. Added extra use-values, extra eye values. And found, when they were finished that the new appliances could be sold well within the competitive range of older products already on the market. Which, strange to relate, is the usual experience when a sound designing job is done with an intelligent concept of the importance of costs as well as of design.

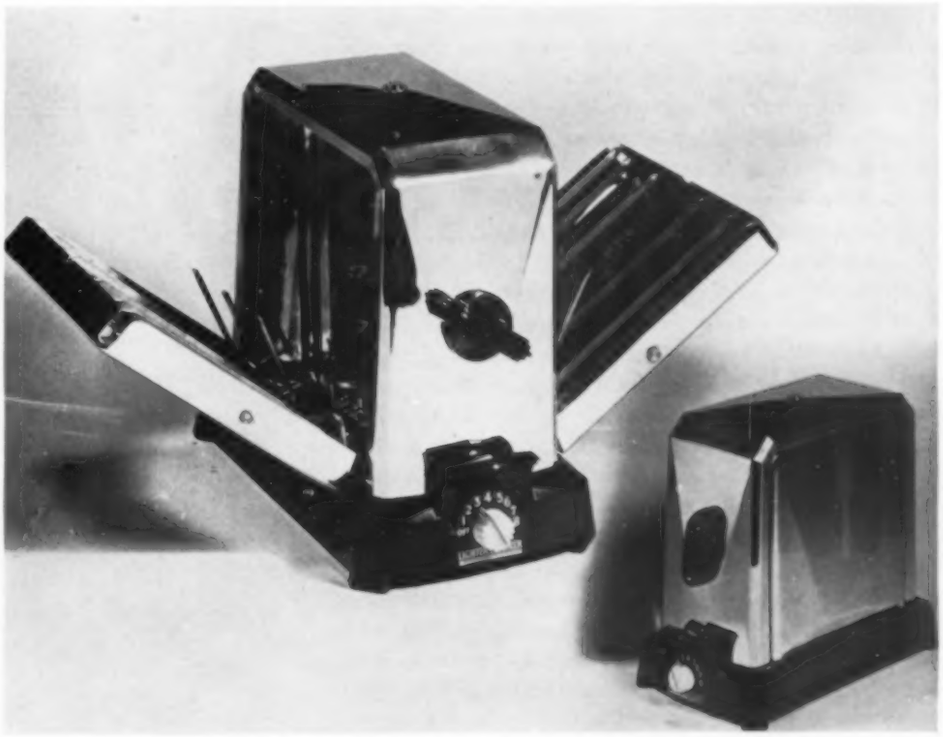
A vital part in the utility and the appearance of both items is played by the molded plastic parts used. And—not at all surprisingly—the use of molded plastics plays an equally important part in maintaining a reasonable cost. For here, as in so many other instances, a single molded part, produced in a single operation, eliminates several non-molded parts, makes unnecessary several manufacturing and assembly operations. Once again, molding keeps the cost down while improving appearance and utility.

Consider the toaster.

An all molded base . . . in one piece . . . replaces the usual assembled stand with metal frame, rubber or plastic feet, and screws and rivets galore. Plastic handles, an integral part of the base, make lifting and moving the toaster an easy, burnproof job. So, too, with the heat-control rheostat. Molded in one unit with the base, this is operated by a small white molded knob located just below one of the handles. Engraved into the molded base, and colored in contrasting white, are the numbers indicating the degree of heat to which the rheostat has been adjusted.

The bread slices are held in vertical metal frames which, when closed, form the smooth sides of the toaster. Turn a molded knob on the end of the toaster, just above the heat control, and a cleverly simple mechanism opens the doors and places the toast in position for easy removal. In every particular the device has been so planned that the most stupid of cooks will find it foolproof, the most particular of housewives will find it attractive enough to grace her table. More important . . . each detail has been planned to combine beauty with ease of assembly and low cost. In this regard, molding makes possible economies not otherwise attainable.

So, too, with the Proctor Iron, in which molded parts have been combined with metal so ingeniously as to make this far and away easier to operate than any of its hundreds of forerunners. Two molded pieces frame in the cork ironing handle, insulating it completely against heat which might otherwise rise through the metal handle standards. A molded rheostat handle is located just under the operating handle so that the heat may be



metal stand or, more likely, misplaced upon a scorchible cloth . . . the operator flips her finger over this molded button, and two metal rods move from their position on the top of the iron to form a stand. Lift the iron and a spring returns the stand to its original, out-of-the-way position without any attention upon the part of the operator. Thus, no time is lost. . . no clothes scorched and no ugly metal stand is present to be brushed to the floor. Once again, intelligent industrial-planning combines mechanical ingenuity with a feeling for good design to produce a better article.

Credit: Tech-Art Plastics Company for toaster base molding. F. J. Stokes Rubber Company for toaster knob molding, Tech-Art Plastics Company for Iron handle parts and molded rheostat lever.

controlled without moving the hand from the iron.

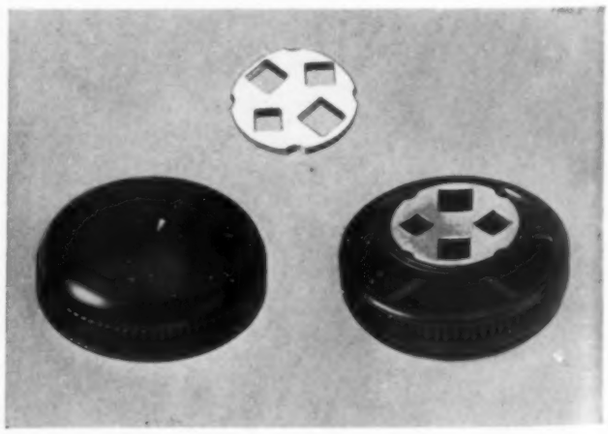
Set within thumbs-reach on the top of the operating handle is a small plastic button which, when not otherwise in use, helps hold the hand in the easiest ironing position. When it is desired to place the iron aside . . . when, in any other case, the iron would be placed on a

SALES INCREASES FOR FOUR-IN-ONE

EVER SINCE the days of bundling, people have been burning their fingers with the various devices they use to keep their houses warm. In the days of fireplaces, the tongs, when left in the fire too long, became overheated. When radiators were first invented, along with central heating, radiator handles were made of the same metal as the radiator pipes, and frequently burned the hands of those who wished to turn them off in a hurry and did not stop to put on gloves.

In the last few years many new kinds of radiator valve handles have been placed on the market. Among them have been valve handles of plastics beginning with the handle introduced by the Diemolding Corporation six years ago, and still in use. An amazing success story could be written about this handle, called the Four-in-One. Harold C. Schmidt of John G. Kelly, Inc., the exclusive representatives for the U. S. of the Four-in-One for the Diemolding Corporation, reports a phenomenal sales record for this valve. When it was first introduced, six years ago, it made an immediate place for itself. There are several ways in which it was superior to existing handles. Its molded phenol resin handle is not easily heated—hence cold to the touch in spite of being attached to a radiator which might become very warm. This valve is also cored out underneath, which helps to keep it cool. It is made in two sizes, the No. 1 for screw assembly valves, and the No. 2 for nut assembly valves, each fitting four different valve stems. The No. 3 and No. 4 fit screw assembly valves and nut assembly valves, respectively, but are made for larger size stems. Hence the jobber and the retailer need carry smaller stocks. And the plumber, in turn, need carry a smaller lot of valve handles with him on service calls.

Other factors have contributed to its success, however. The comfortable knurl gives it a good grip. Its strong construction makes it durable. It does not crack or change shape like wood or fibre. And it is handsome. Its dull black surface is more attractive than a brilliantly gleaming imitation of less expensive material. And it adapts itself to almost any kind of tools so well that they say it has "tool universality," and can be adjusted by almost any one.



. . . . SEE IT WORK WHILE YOU SWEEP

Panel of Transparent Plastic Permits View of Interior Workings of Sweeper Which Embodies New and Practical Features

By R. T. ELLIS
Du Pont Viscoloid Company, Inc.

THE old-time carpet sweeper, like most other household utilities, has finally been modernized, and the E. R. Wagner Company, of Milwaukee, Wis., has done it. To say that sweeping changes have been made is figuratively and literally true, for the new Wagner Komb-Kleaned Sweeper has a dozen improvements to recommend it to housewives.

The accompanying illustration shows a graceful, nicely proportioned unit in the modern streamline style, with neatly closed ends and a beautiful finish. This sweeper is ready to keep company with the best furniture and not look out of place. Note, too, that the center panel is transparent, so that one can observe the brush and other working parts. Under operating conditions, that is a real advantage, for the housewife can see at a glance when the dust pans need to be emptied, thus avoiding the likelihood of overloading them inadvertently and causing the dirt to drop down on the carpet or rug. Moreover, the transparent top, which is made of pyroxylin sheeting material, admits light, which in effect reduces one old-time hazard—the sweeper as a breeding place for moths and germs.

Other advantages of note are two steel combs that contact with the brush as it revolves, thus automatically keeping the bristles clean and functioning at high efficiency; high and low brush adjustment to meet conditions of use; a thick live-rubber bumper extending around the entire case; solid rubber wheels, with cushion treads; graphite-impregnated wheel bearings; non-revolving steel axle shafts; solid metal end-covers; dust pans of the non-rattle type, and other desirable features in keeping with an exceptionally fine product, designed and built by a concern that has specialized in this field for thirty-five years. More information about the Wagner Komb-Kleaned Sweeper may be obtained by writing direct to the manufacturer at 4611 North 32nd St., Milwaukee, Wis.

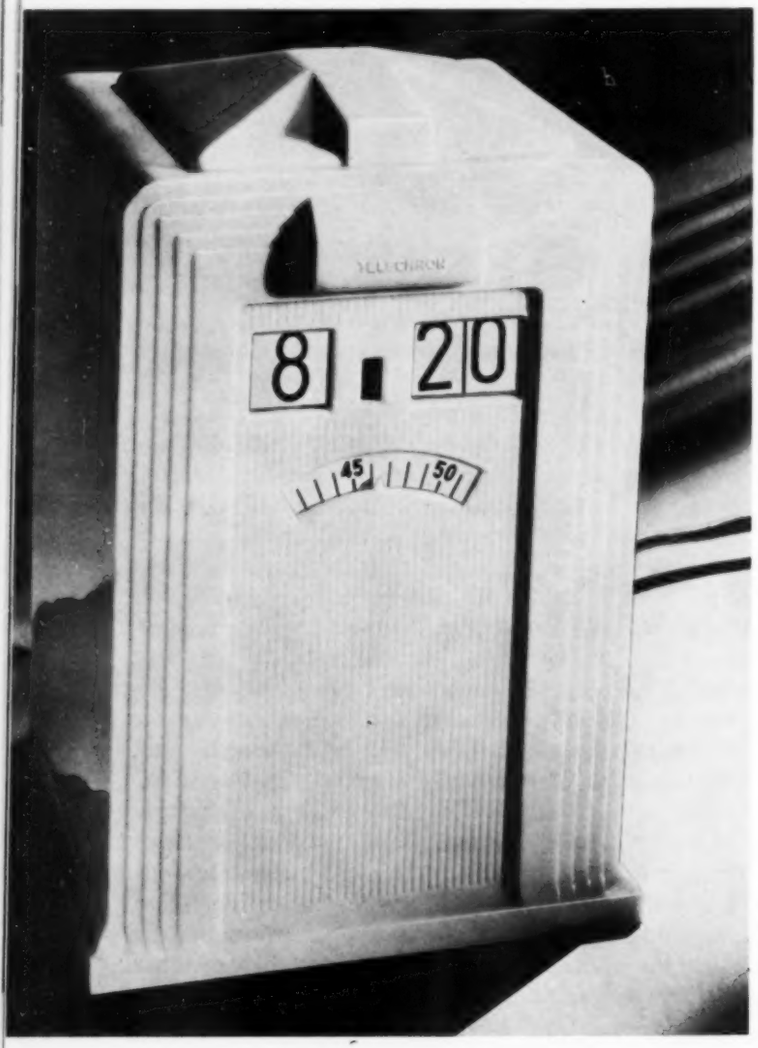
The new Wagner Komb-Kleaned Sweeper lets the user know its performance—the transparent top does the trick. Illustrations shown through the courtesy of Du Pont Viscoloid Company, Inc.

The use of pyroxylin in this modern household appliance calls attention to the remarkable versatility of this plastic. Ease of fabrication and the variety of forms in which it can be obtained make the material adaptable to many manufacturers' needs, and new applications constantly are being devised for it.

Then, too, this application of a plastic furnishes another example of the ability of such materials to be used in a practical and useful way in conjunction with other materials—a means of modernizing in design and construction many of the appliances which are in constant use in the household, office, factory and elsewhere where used as a substitute—and it is generally admitted that the use of plastics extends far beyond that province—it is invariably found that plastics are winning new laurels in adaptability and economy.

TIME FOR ALL AGES—FROM EIGHT TO EIGHTY

THE Warren Telechron Company is one of the largest, one of the oldest manufacturers of electric clocks. Through thousands of dealers it sells literally hundreds of thousands of clocks. Its market extends across every imaginable local, racial and age classification. Its products include clocks in every price range from three-and-a-half dollars upward. Obviously, its products must be planned to reach—by one means or another—the common denominator of general taste.



When, therefore, such a firm consistently use plastics—phenols, ureas and cast phenolics—year after year, it can be taken for granted that plastic materials have in them the qualities that match the basic, elemental tastes of people of every sort. The public favor for such clock cases obviously extends beyond the particular reactions of rich and poor, educated and uneducated, and reaches down to those basic tastes which are common to all of us.

What are these tastes? How can others, in entirely different lines of manufacture, capitalize the advantages of plastic materials for their own products?

First and foremost stands the possibility which plastics offer for the achievement of pleasing lines and shapes. Far better than most other materials, plastics lend themselves to association with furniture and accessories of every sort. You can place a plastic clock upon a marble mantel, upon a wooden console, upon leather-topped desk and, in each case, achieve a maximum of pleasing effect without a jarring note.

Secondly: plastics, of all materials, best meet the universal demand for color—pleasing, warm, and harmonious color. Plastics in texture and color harmonize not only with the woods and metals and enamels of clock faces, but harmonize equally well with the materials near which or upon which they are placed.

Last, but by no means least important, plastics make possible the achievement of effects not otherwise obtainable except at infinitely higher costs. A one-piece plastic clock case, were it to be duplicated with equal effectiveness in wood, would require the assembly and processing of ten or twenty different wood seg-

ments. Done in plastics, a better, more lasting, more pleasing effect is achieved in a single molding operation.

So much, then, for the theory of plastic usage which Warren Telechron has proved correct in practice. Let us see how flexibly the theory works out in actual design, production and sale.

Eleven of the new clocks in the Telechron line are encased in plastic or part-plastic bases. They range from the low-priced "Quacker" model, designed for children, to medium and medium-high priced desk and table models along both modern and classic lines.

The Telebell model, shown at the top of the preceding page, has a tubular molded black case, set in a molded ivory base held in place by horizontal ivory rods. A cast phenolic knob on the alarm shut-off at the top of the clock completes the ensemble. Utilizing the same molds, another Telebell model varies the color scheme by having a light frame and a black base. Here, plastics permit wide variations in effect by permitting the variation of color at no additional cost.

Compared with the usual types of non-plastic alarm clock, this warm, pleasing-to-the-touch, sturdy model presents obvious sales advantages. Yet its cost is no higher than that of any reasonable good electric alarm much lower, in fact, than that of many others.

The "Duke" model, also shown at the top of the preceding page, cleverly combines a molded plastic case with gold trim and a gold bezel. For table and desk use it has been designed to give the maximum possible visibility of face with a minimum size.

The "Minitmaster," is a larger clock utilizing the now extremely popular "speedometer" type of face, with interior lighting to illuminate the numerals. Here plastics provide obvious advantages over wood or metal construction. If made of wood, this case would be extremely expensive because of the intricate model of both the front and top. If made of metal, its cold feel would be far less pleasing than that of the molded material used. Done in plastics, color may be varied to meet demand, with the certain knowledge that, whatever the color, a pleasing, harmonious effect will be obtained.

Most ingenious of the new models is the "Quacker" model, designed for a child's room. Here plastics have permitted the designer the fullest sway of his imagination. The clock ceases to be merely a part of the furniture and becomes an educational and entertaining toy—something that parents will willingly buy and children eagerly cherrish. Here again, the ease with which plastics permit of color variation becomes of paramount importance. The clock is offered in yellow, black or blue cases with orange colored beaks and white or black eyes.

Turning from youth to age, Telechron presents the "Autolarm," a desk or mantel model molded in a walnut color, with highly embossed scrollwork on the front contrasting with smooth, glistening surfaces on sides and top. Metal legs and handle lend a touch of color without detracting from the all-important molded surface.

Thus, in these and other models, plastics run the range of design possibilities, the gamut of color while, in every case, providing definite sales and production advantages not otherwise easily obtained.

Credit: To Northern Industrial Chemical Company for molding of the entire line; to Bakelite Corporation and General Plastics, Inc., for Bakelite and Durez used in black cases; to Beetleware Corporation and Toledo Synthetic Products, Inc., for Beetle and Plaskon used in white and light colored cases.

PLASKON

GAME:

New Yorkers are playing "On Me" in place of the pari-mutuel nowadays. The most recent contribution of the House of Gadgets to *le sport* gives the opportunity of backing a favorite cocktail in an exciting—and remunerative—way. The selection of the plastic which houses the ingenious betting mechanism depended upon its durability and color beauty. The choice of Plaskon moldings in red and in green tells the story quite completely. Molded by Imperial.

BOX:

Boxes in Plaskon render a double service. They sell the article and keep the customer pleasantly reminded of his purchase long after its occurrence. Ask the Pioneer Suspender Company. Their antiqued, ivory and black reuse boxes are raising eyebrows and loosening purses. And Pioneer belts are enjoying the success that smart packaging brings to fine quality. A direct hit for Plaskon — molded color. American Insulator is the molder.

TRAY:

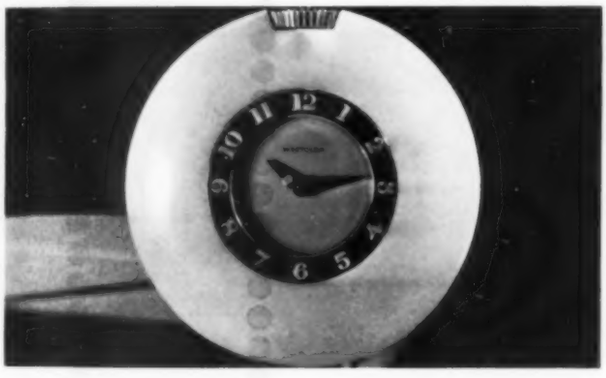
Bringing to the boudoir a distinctive new accessory to beauty, Lenthéric of Paris has designed this ensemble tray, to hold three crystal decanters of their daytime fragrance, Bouquet Lenthéric. Exacting Parisian taste dictated the correct material—Plaskon — molded color. Molded by Northern Industrial Chemical Company.

MOLDED COLOR

NOVEMBER 1934

CLOCK:

Plaskon and "Quacker" have joined hands to make the nursery the slightly crazy place it should be. Colorful Plaskon moldings of ducks and lions and all the rest of the animal inmates are now become casings for Warren Telechron clocks. Mother Goose, we learn, is delighted. And the kids are learning to read time in half the time. The colors are yellow, black, or blue. Northern Industrial is the molder.



WATCH:

Ear to the ground, Westclox learned that the handbag watch in colors would be vogue this winter. The wide range of Plaskon — molded color — beauty is now combined with excellent workmanship in the impressive, but inexpensive Westclox creation. Another demonstration of Plaskon "timeliness." Molded by Chicago Molded Products.

AND MORE CLOCKS:

We don't want you to think that Plaskon has a monopoly on clocks, but we would like to show that it is used inside the clocks as well as for casings. Here's a view of the interior of the new Pennwood model. For the highest contrast between the black numerals and the white body on the time-recorder, Plaskon is chosen. Molded by Chicago Molded Products.

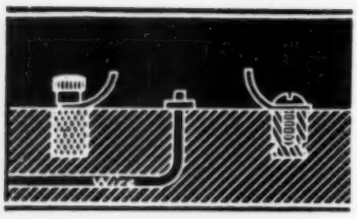
Your letterhead and your signature on it, will bring both the useful chain of Plaskon color discs and the Plaskon—molded color—booklet to you.

TOLEDO SYNTHETIC PRODUCTS INCORPORATED

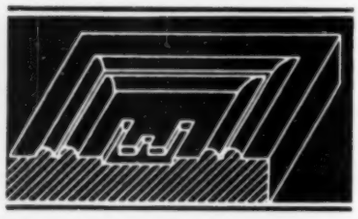
TOLEDO · OHIO

ADVANTAGES AND LIMITATIONS of Phenolic Molding Compounds

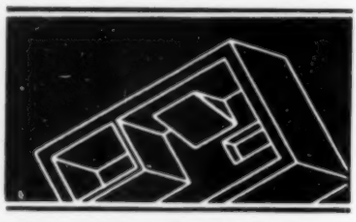
Modern Plastics here presents, through the courtesy of General Plastics, Inc., a graphic tabulation of Phenol-plastic properties which you will want to keep on your files. *Don't tear this page out.* Write for a reprint, on heavy stock, suitable for filing.



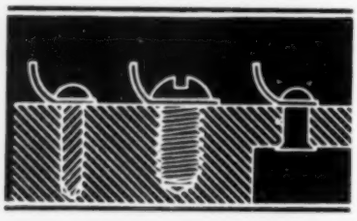
INSERTS—threaded metal inserts, contacts, terminals, wires and inlays may be imbedded in phenol resins during the molding process, making later assemblies easier, less expensive, stronger.



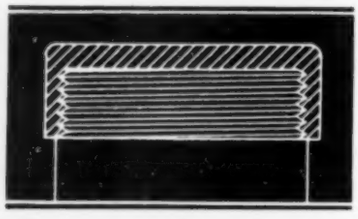
DETAILS—lettering, trademarks, decorative details, ribs, can be molded into any phenolic resin piece, provided they permit withdrawal from the steel mold. Simple ones add little to the cost, especially if they can be machine cut or hobbed in the mold.



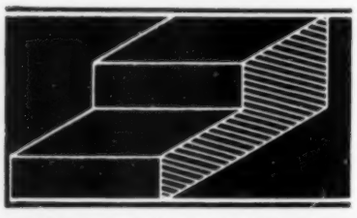
SINGLE OPERATION—most molded phenolic resin pieces come from the mold virtually ready for packing, with removal of slight "fins" the only finishing needed. Thus formerly complicated assembly jobs become single operations with no buffing, plating or coating necessary.



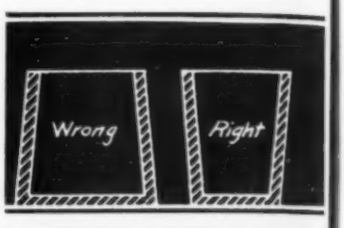
TAPPING, RIVETING—molded phenol molding compounds can be drilled and tapped without difficulty, or, if the strain is light, holes can be molded in, and drive screws used. Rivets often facilitate assembly, but should be carefully specified.



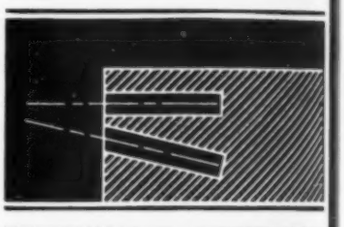
THREADS—strong accurate threads can be molded into phenolic resins without extra operations, permitting permanent joining of sections, or easy removal without binding or stripping.



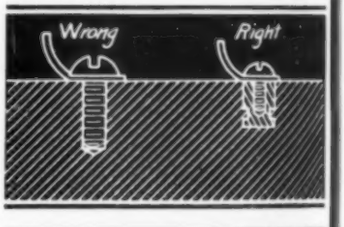
INTEGRAL COLORS, FINISH—the colors of molded phenolic resins extend all through the piece, and are not applied. They can't chip, peel or wear off. The lustrous surface is also integral with the piece, and never corrodes, dulls, clouds, checks or loses its original sheen.



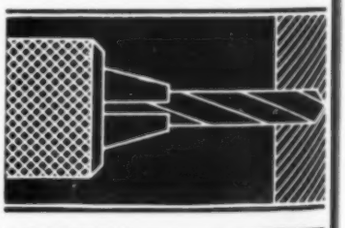
UNDERCUTS—phenol molding compounds set hard in the mold. Cavities and holes therefore should be straight, without undercuts or projections to prevent straight ejection from the mold. Undercuts can be handled in split molds, but cost more.



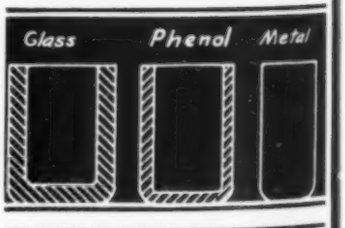
SIDE HOLES—though practical, horizontal side holes in a molded piece slow the operation, and lead to breakage. Sometimes they're necessary, but avoid them if possible. Slanting or oblique side holes are even more troublesome.



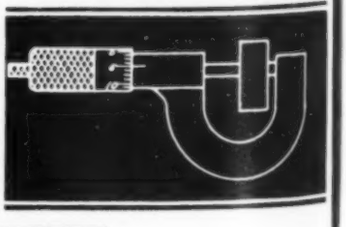
TAPPED HOLES, NAILS—small tapped holes in molded phenol resins are laborious and not very practical, except where strain is light. Threaded metal inserts are stronger, more permanent. Driving nails in phenol molding compounds is impossible.



MACHINING—machining molded phenolic resin pieces is practical but difficult. It dulls tools rather quickly, requiring alloy steel or diamond cutters for high production work. Sometimes a machining operation is economical because it eliminates a split or complicated mold.



WALL THICKNESS—wall thicknesses should reflect a material's tensile strength. Thus phenol molding compounds require thinner cross-sections than glass but thicker than metal.



TOLERANCES—tolerances can be held to plus or minus 0.002" on smaller dimensions, or plus or minus 0.004" on larger. Unless necessary, avoid specifying closer limits. Ordinarily, plus or minus 0.004" is the accepted tolerance for precision molding.

BEAUTY, RESONANCE, LIGHT WEIGHT AND ECONOMY IN PLASTIC RADIO CABINET

THE fallacy that a wood case for a radio set was almost indispensable for good reception has been successfully exploded by Emerson Radios. In the experience of this company reception is as good from a cabinet of plastics as from a wood cabinet. More impotant, this experience has been confirmed by the opinions of those who, rightly or wrongly, exercise much control over the materials used in construction—the general public of radio purchasers.

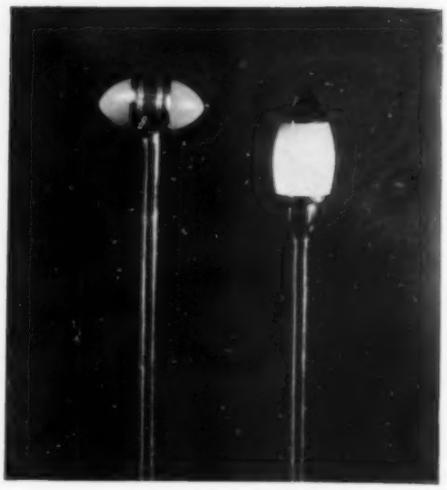
A case of molded plastics—light, durable, easy to keep clean, and of uniform quality for both the front and the back of the case—has proved its sales appeal and its practicability to such an extent that the company has prepared a second model in a case of molded plastics to be released shortly after the first of November. The first model was issued over a year ago, and not one remains on hand at the factory.

The small desk radio, scarcely larger than ten inches by fifteen inches, or even smaller, finds a wide usefulness among apartment dwellers and persons who wish the convenience of a radio without the cumbersomeness of a larger table set or, more particularly, of a console set. The new Emerson desk radio, to retail in the twenty dollar or "moderate" price range, will be an AC-DC set, with the usual compact oblong case associated with desk sets. A dial on either side of the center silk grid screen carries out the appearance of symmetry. Of simulated walnut, it will harmonize with most wooden furniture.

The use of plastics had made possible, within the low-cost-limits necessitated by the price range of miniature radio sets, the achievement of decorative effects which, were wood used, would have been prohibitive in cost.

Smooth sides and smooth rounded corners contrast with the elaboration of the front of the case. The modeling of the loud speaker ports is carried across the entire face of the case, being backed up, on the two side panels, by a subordinate ribbed molding effect. Dial numerals and the Emerson trade mark are in white to provide full visibility in contrast to the walnut color of the case itself.

AUTOMOTIVE USES OF PLASTICS ARE CONSTANTLY GROWING



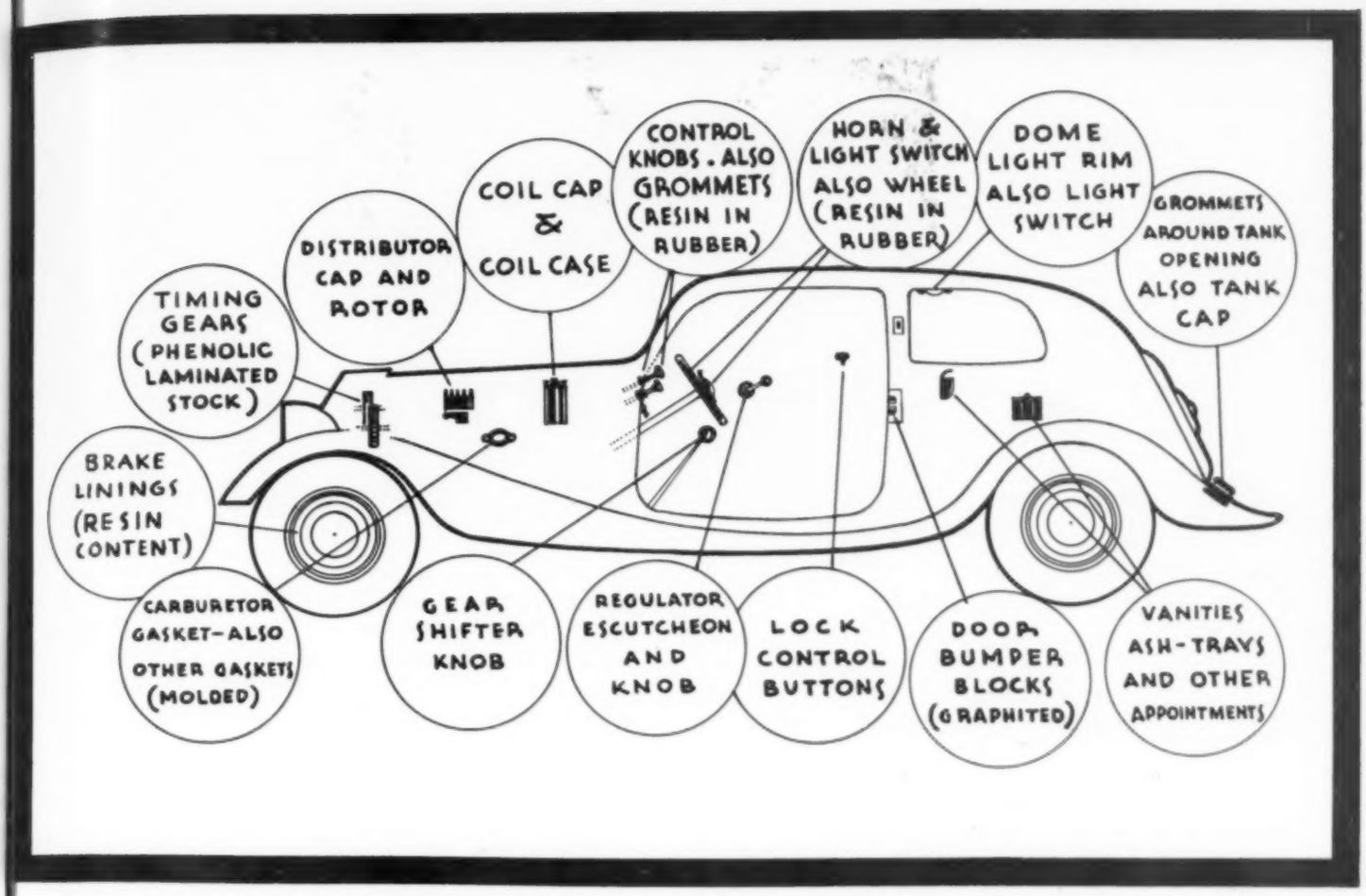
The familiar fender-parking guide gains a new usefulness when translucent cast-phenolics, with or without interior lights, add parking-light protection. The two lights are shown through the courtesy of the American Catalin Corp.

AUTOMOTIVE manufacturers have long ranked among the large users of plastics. As in many other industries, however, the chief applications have been for dielectric purposes. But today this situation is changing and there are now many parts formed from plastics which perform structural and decorative functions and have no direct relation to the electrical system of the car. As newer plastics are developed and the possibilities of the older types become more fully appreciated, there seems to be little doubt that nearly all the plastics will be used more and more in passenger cars and some other automotive vehicles.

There are, of course, sound economic and engineering reasons for the growing use of plastics. Quite aside from the excellent dielectric properties of many plastics, it is well to remember that some forms have a strength equal to that of some common cast metals, are lighter than even the magnesium alloys and come from the mold in finished form, requiring no applied finish such as is needed on many exposed metal parts. As the application of a finish to metal often costs more than the part itself and frequently several times as much, plastics have a marked advantage in this respect. Many of them also are very beautiful as compared to most materials of construction and all are well adapted to use in combination with metals with which they often contrast pleasingly. Some types are available in transparent or translucent form and so can be substituted for glass which is also much more friable.

Besides these advantages, it is well to remember that plastics can often be applied in such a way as to promote silent operation; that they are highly resistant to water, oil, gasoline and most cleaning compounds; that they are not subject to corrosion and are quite resistant to weathering action; and that they are smooth and possess a good "feel," partly because they are poor conductors of heat, which tends to make them feel warm rather than cold when touched. All of these and certain other factors, to be mentioned later, render modern plastics deserving of careful consideration by the engineers as well as by the stylist or designer whose first concern is to improve the appearance of the product and add to its sales appeal.

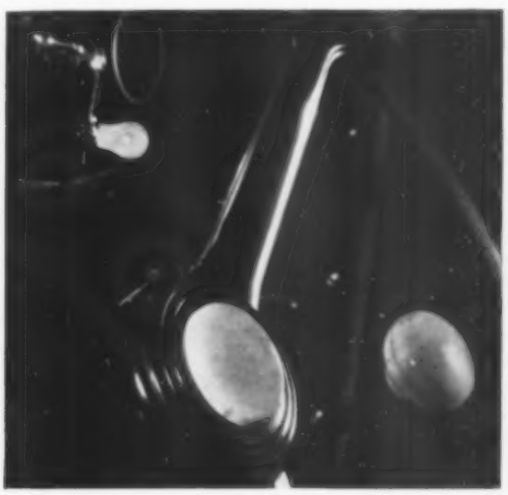
Magneto coil cases and caps and numerous other electrical fittings of motors are "naturals" for plastic molding both because of dielectric qualities and because of high wear, oil and vibration resistance inherent to these materials.
Photo courtesy of General Plastics, Inc.


TIMING GEARS (PHENOLIC LAMINATED STOCK)
DISTRIBUTOR CAP AND ROTOR
COIL CAP & COIL CASE
CONTROL KNOBS. ALSO GROMMETS (RESIN IN RUBBER)
HORN & LIGHT SWITCH ALSO WHEEL (RESIN IN RUBBER)
DOME LIGHT RIM ALSO LIGHT SWITCH
GROMMETS AROUND TANK OPENING ALSO TANK CAP
BRAKE LININGS (RESIN CONTENT)
CARBURETOR GASKET-ALSO OTHER GASKETS (MOLDED)
GEAR SHIFTER KNOB
REGULATOR ESCUTCHEON AND KNOB
LOCK CONTROL BUTTONS
DOOR BUMPER BLOCKS (GRAPHITED)
VANITIES ASH-TRAYS AND OTHER APPOINTMENTS

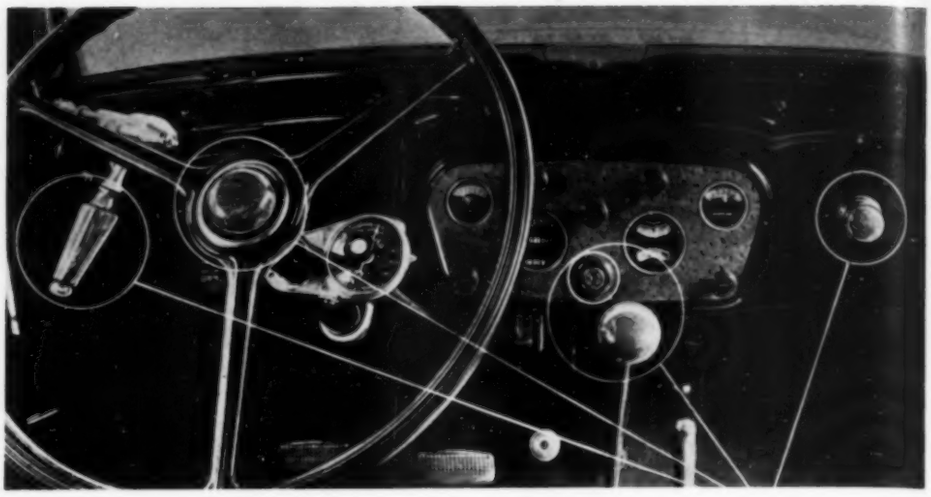
Modern motor cars employ practically every type of cast, laminated or molded plastic from front wheels to gas tank . . . from dome lights to timing gears. Illustration courtesy of General Plastics, Inc.

Nearly all modern American automobiles use from about one to several pounds of plastics in their construction at present. This does not, of course, include the ordinary forms of either soft or hard rubber. Plastics are employed also in trucks, motor boats, aircraft and other automotive products, hence the total weight used runs into several million pounds annually. Molding compounds range in price from about twelve cents per pound upward to several times this figure, and sheet and cast forms average considerably higher, hence the total expenditure for automotive plastic applications is quite large.

The most general application of phenolic plastics in automotive vehicles is in parts of the electric system where a good dielectric is required, as in distributor heads, coil parts, switch parts and related elements. These applications are too well known to require extended comment, but it should be said that noteworthy improvements have been made in dielectric strength and in arc resistance which are important factors in electrical insulating parts. When flash-overs occur as a result of arcing on a phenolic surface, they leave a carbonized track which results in subsequent electrical leakage and may render the part useless. Some phenolic com-



Leading motor cars now use molded plastics in such appointments as horn button, dash control, gear shift, and window regulator handle knobs. Photos at the right through courtesy of Tennessee Eastman Corp.



Cast phenolics, when used, as in this car, on driving and light controls, lend themselves to wide variation of color schemes to conform with the individual's taste. Here five handles and knobs are shown through the courtesy of the American Catalin Corporation

pounds, however, offer so high an arc resistance that flashovers rarely occur and difficulty is avoided on this score.

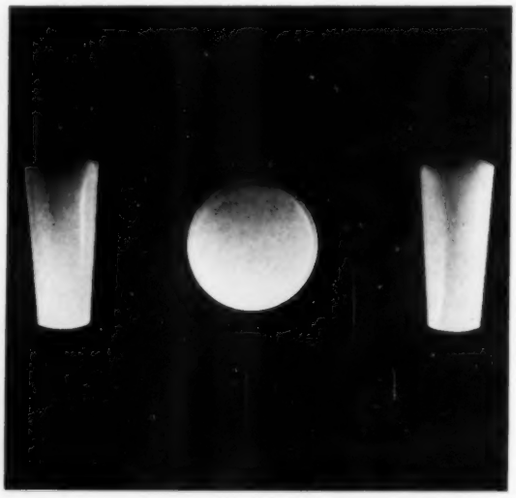
Phenolic products having fabric fillers of the right type have high strength (up to 20,000 lb. per sq. in. tensile) and are highly shock resistant as well as non-resonant. This accounts for their highly successful use in timing gears, which not only have long life and high wear resistance but promote quiet operation. Even solid gears, of uniform thickness from hub to rim, are quieter than metal gears of the same type as to tooth form, but the phenolic gear having a web connecting the hub and rim is still quieter and the spoked type of Celeron gear, recently developed, is reported quieter than even the web type.

Other structural and non-electric uses of phenolics for automobiles include steering wheels, instrument-board fittings, including many control knobs, and the recently developed dovetail blocks that fit in door jambs and have been substituted for metal blocks which wore much more rapidly, corroded and gave other troubles. These blocks—molded from Durez having a graphite content—require no other lubricant, are clean and are reported highly successful. It would seem entirely feasible to mold bushings and other bearing parts from the same or similar compounds, especially as bearings made from fabric impregnated with phenolic resins and molded under heavy pressure have been used with much success in steel-mill and other types of heavy machinery and are reported to have outlasted bronze and babbit bearings and to have worked well with no other lubricant than water. Similar materials having high resin content are used in one of the latest spring suspension systems with considerable success, and phenolics have long been used in impregnating brake linings.

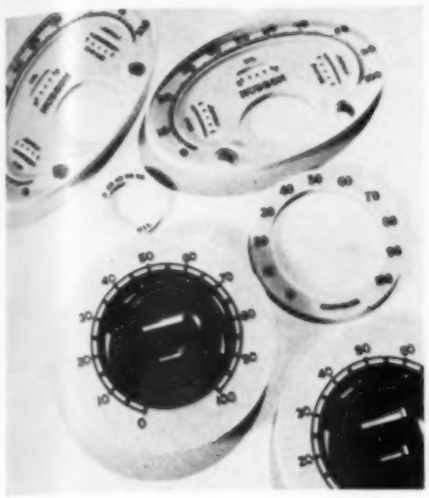
It would seem to be quite feasible to mold entire instrument boards as well as garnish moldings. Such moldings would not require the expensive wood-grain finish now used on metal parts of this kind and of course would avoid the wearing through of such finishes where coat sleeves rub, as in the metal type. Ash receiver and vanity cases can be molded, of course, though they are mostly stamped or cast from metal at present.

Laminated plastic panels would make excellent interior trim, as would some of the water-proof phenolic treated fabrics now available. Such materials would be much easier to keep clean than the ordinary fabrics used for interior trim.

Phenolics which are cast, chiefly in the form of rods, tubes and sheets, though more costly than molded plastics, are available in an unlimited variety of transparent, translucent and opaque forms and colors and are excellent for decorative applications such as knobs and handles. They have also been used effectively in the heads of fender markers as well as in cigarette lighters and other instrument-board fittings. Some forms of cast phenolics can be shaped slightly by molding, but nearly all products made from this type of phenolic are shaped by machine operations in which the material is turned or cut in some other manner and subsequently polished. Such items are not only beau-



Urea plastics lend themselves particularly to use as dome and side lights because of their translucency, superior in appearance to that of frosted glass. Lights here shown through the courtesy of Toledo Synthetic Products, Inc.



Dashboard indicators were formerly made of highly processed metals. Today, a single molding operation produces more attractive gauges at a remarkably low cost. These, in white Plaskon, are shown through the courtesy of Toledo Synthetic Products, Inc.

tiful but highly resistant to water, weather and other deteriorating influences and have good physical properties. This type of material includes cast Bakelite, Catalin, Marblette and Crystalin, and is sold also under other trade names.

Urea plastics which are molded in the same way as the phenolic type include Plaskon, Beetle and Unite, among other makes, and have gained important automotive uses in recent years. Their properties are similar to the phenolics in most respects, but they are available in white, ivory and light pastel tints which are translucent and do not darken in use. As they are somewhat more expensive than the phenolics, they are used chiefly where the color and translucency are important considerations. This applies especially to such parts as dome-light lenses and instrument-board fittings, including translucent panels designed to serve as dials for speedometers and other instruments. These urea panels can be debossed for wiped-in lettering and scales, and, being translucent, are readily illuminated by a hidden lamp placed back of the panel and transmitting its light through the panel. As the panels diffuse the light well, there is no glare, and as they are light in color and the markings are dark, the latter show up well also by reflected light in the day time. Other automotive uses of urea moldings are chiefly in knobs or handles in which the light tones offer a pleasing contrast with darker surroundings.

Translucent dome-light lenses and other translucent urea parts are, of course, virtually unbreakable in normal use and much less likely to be broken in service or in transit and handling than is glass. They are also non-inflammable, are lighter than glass and are more readily fastened without breakage, and thus perhaps less likely to rattle. They can, of course, be molded with holes for instrument spindles, fastenings and the like and can also be made to support the instruments if desired.

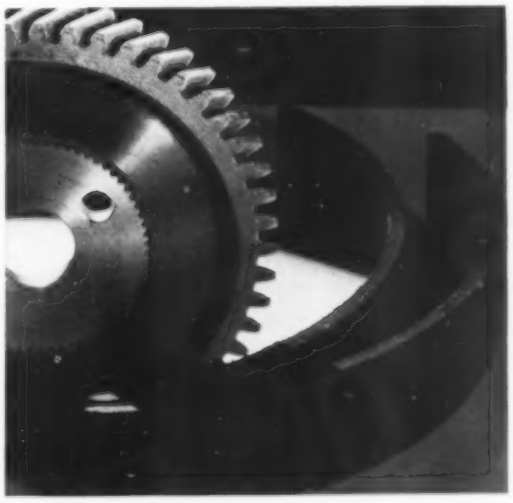
Very thorough curing is quite important with urea moldings and thin sections are and should be used wherever feasible, as they facilitate a good cure in a short time. Although metal inserts are sometimes used with success in ureas, they are better avoided, as they occasionally result in cracking, especially where sections are thick.

1935 will see further uses of phenolics and cellulose acetate plastics. Developments of rather startling new uses and the possibility of substitution of these materials as finishes on decorative metal parts are more than possibilities. Outdoor exposure qualities (as in the case of the Plaskon gasoline meter head) are also receiving further consideration.

Cellulose acetate plastics, though excellent in many respects and available in a wide range of colors—including transparent and translucent types—are not much used in automobiles in their molded form, except for a few window-regulator and other knobs. The chief automotive use of this material is in sheet form as the intermediate layer in safety glass. As the latter has now largely displaced ordinary glass in passenger cars and many square feet are required in the average closed car, the quantity used for this purpose is large. Acetate thus used retains its transparency and color and is so excellent in its adhesive qualities and in freedom from flaws and from adverse effects of moisture absorption and light exposure, that it has displaced much if not all competing products for the same use. Acetate powders are readily molded but average around twice as much per pound as the urea type, which precludes their extensive use in molded form.

Acetate, which is sold under such trade names as Tenite, Masuron, Lumarith, Fibestos and Plastacele, is usuable in sheet form for open-car curtain lights, but the somewhat less expensive nitrocellulose (pyroxylin) plastics are generally used for this purpose. The latter burn explosively if ignited, whereas the acetate is slow burning, and become brittle under light exposure.

Many other plastics are available for automotive use, but few of them, except the cold-molded type—extensively used in the manufacture of battery cases—have gained any considerable use in the automotive field. Certain of the vinyl resins, one of which is called Vinylite, have (*Continued on page 69*)



Laminated plastics have found one of their widest fields of usefulness in the silent gears and brake linings of modern cars. Phenol resins make possible much of today's motor quietness, safety. Photo courtesy General Plastics, Inc.

SUCCESS STORIES

★

Product: Record
Manufacturer: Sound Studios of New York
Description:

To realize completely the advantages of "spot" broadcasting in advertising, the record on which the original studio program is transcribed must have special sound quality. Nothing gives an audience the feeling that the program is "second-hand" more than deadened tone and scratching noises. Once formed, such an impression becomes a boomerang to the product associated with the program. Manufacturers were therefore extremely cautious in using this form of radio advertising, despite its comparatively moderate cost. The record illustrated, produced by Sound Studios, insures noiseless recording and perfect reproduction.

Manufacture and Materials:

The record is made of Lumarith, a cellulose acetate material prepared in a special formula for broadcasting records. The program is recorded in the studio on a wax disc and this disc is coated with a layer of 22 Karat gold which is, in turn, coated with a heavier layer of copper. The wax is then stripped away, leaving the impression on the gold-faced copper disc. Using this "Master" disc the process is repeated to produce the "Mother." A further repetition of the two coatings on the "Mother" disc gives the "Stamper," which is placed in the steel mold along with a piece of Lumarith. An hydraulic press exerts pressure of one ton per sq. inch for a few minutes under heat and the job is finished.

Sales Success:

The record found a ready market in broadcasting companies who had long been looking for its like. The fact that the record did not crack and never suffered in the mails made it doubly welcome in an industry where time is vitally important, and there is no time for replacements. The World Broadcasting System installed $200,000 worth of equipment for their production.

★ ★

Product: The Remler Attenuator
Manufacturer: Remler Co., Inc.
Engineering Design: W. L. Nahm, General Manager, Remler Co.

Description:

The Remler Attenuator is a control instrument used in radio broadcast work for modulating and "mixing" various microphone currents. It is a precision instrument of the highest order, due to the extreme care required in handling complicated programs, and must be considered as a separate entity rather than a part of the broadcast equipment.

One of the unusual things about this instrument is the stress laid upon the attractive design in the company's advertising—probably the first time that conscious control of appearance has been applied to anything in the broadcast room. In addition, of course, are a number of unusual mechanical features, all built around the inherent versatility of plastic moldings which form the major part of the attenuator.

Manufacture and Materials:

From the photograph it will be seen that there are a large number of metal inserts imbedded in the various moldings—41 in all—which carry the microphone currents through the instrument and form graduated contacts with the resistance unit. Unlike ordinary rheostat construction, the switch hand does not ride over coil

windings, with the possibility of creating static and jerky control, slides over 32 brass contacts molded into the body of the instrument during molding. To position these contacts equidistant in the hot molds was too delicate a task to trust to gloved-handed press-men, so a special jig was developed for the job.

Another unusual precision feature is a molded Durez snap-ring cover, shown in the right foreground of the photo, which fits around the windings and protects them from moisture and temperature change. The natural elasticity of the plastic material sufficed to keep proper tension. Also unusual is the fact that the control shaft is entirely electrically isolated, accomplished by permitting the plastic mass in the mold to flow between the shaft and the shaft contact plate. The exceptional attractiveness of the unit is largely the result of carefully polished molds, tasteful engraving of numerals, and excellent contrast in the three-piece dial and bezel.

Sales Results:

Excellent. Although there is no previous model with which to gage a sales increase, the Remler Company is convinced that the attention paid to appearance paid excellent dividends.

★ ★ ★

Case History:
Product: Plate
Manufacturer: The Richardson Company
Designer: Ernest Worthington
Description and Design:

After quality, the manner in which spinach is served is the most important factor determining its consumption. Popularly, when it comes to children, it is the most important factor. A child will eat spinach only when its nourishing qualities are concealed—or overridden—by some incidental diversion. Using this standard bit of humor for a basis, the Richardson Company reasoned that lagging appetites would be accelerated and a serious market created by an eating plate designed especially for children. Ernest Worthington's turtle plate is the happy result.

This plate is not a plate at all, but the shell of a turtle whose other physical aspects appear in proper order about its circumference. The shell is divided into three sections which smack of the adult "blue plate"—a touch children delight in; and one that does much for neatness.

Manufacture and Materials:

The nature of the ultimate consumer demanded that the plate be able to take an amount of rough treatment, without damage. Further, the material had to be available in varied colors, an important consideration in the manufacture of any children's goods.

An interesting feature is the special ribbing on the base that minimizes the chance of slipping from the table.

Sales Success:

The plate has enjoyed uninterrupted popularity since the first week on the counters. It was a best seller in the novelty line last Christmas season, and Richardson officials will be disappointed if it does not do even better during the approaching holidays.

WHICH PLASTICS TO CHOOSE? III

This is the third in a series of articles describing the various plastics and telling about their applications. Previous articles dealt, respectively, with the phenolic and urea type of molding plastics which differ in important respects from the cast product here described. Succeeding articles will deal with still other types of plastics, each of which has important industrial applications

CAST PHENOLICS---THE JEWEL-LIKE PLASTICS

by Herbert Chase, M.E.

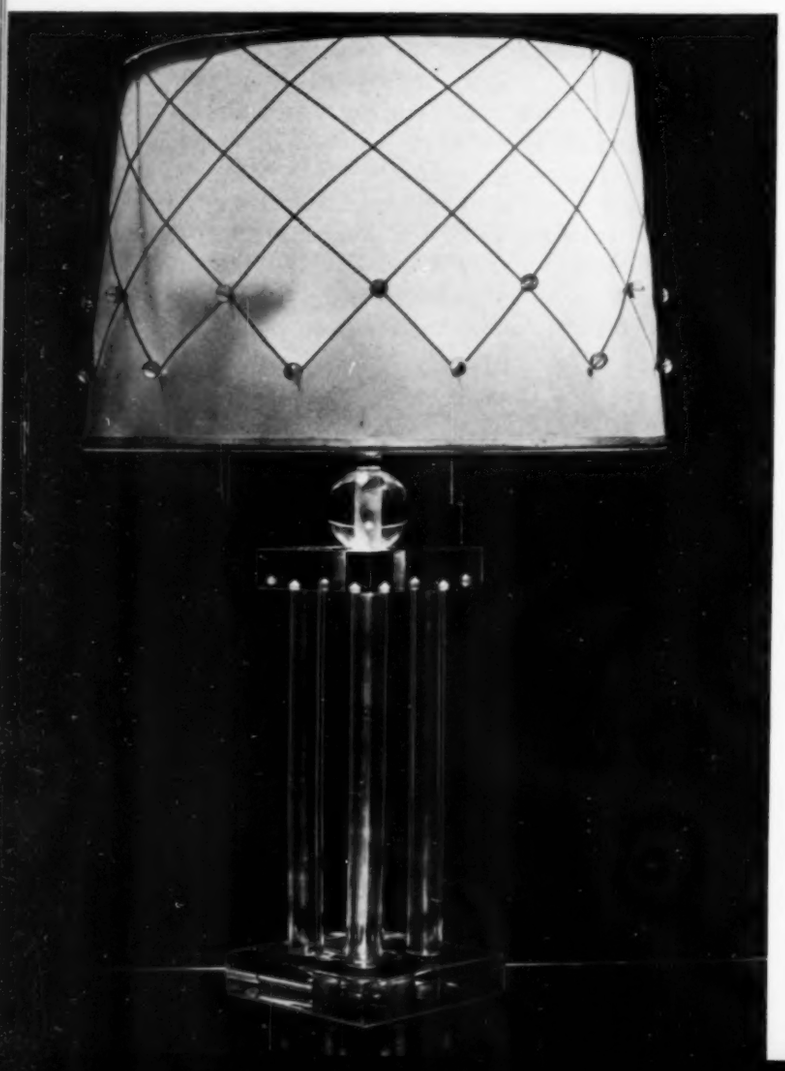
CAST PHENOLICS are rightly classed as among the most beautiful of all the plastic materials. In appearance, many of them resemble precious jewels, yet their moderate cost makes them available for a wide range of applications. Other types are similar to the beautifully colored marbles and onyx; still others are made in plain colors, varying from crystal clear, water-white or tinted to almost any depth of color, to translucent or even opaque colors and jet black.

Although the cast phenolics have a certain family connection, so to speak, with the molding phenolics, they are essentially different not only in appearance but in the method by which they are converted into countless objects of beauty and utility. As the name indicates, the cast phenolics are cast rather than molded, and they are cast into rods, tubes, sheets or special shapes before they are converted into the numerous forms in which they reach the ultimate consumer.

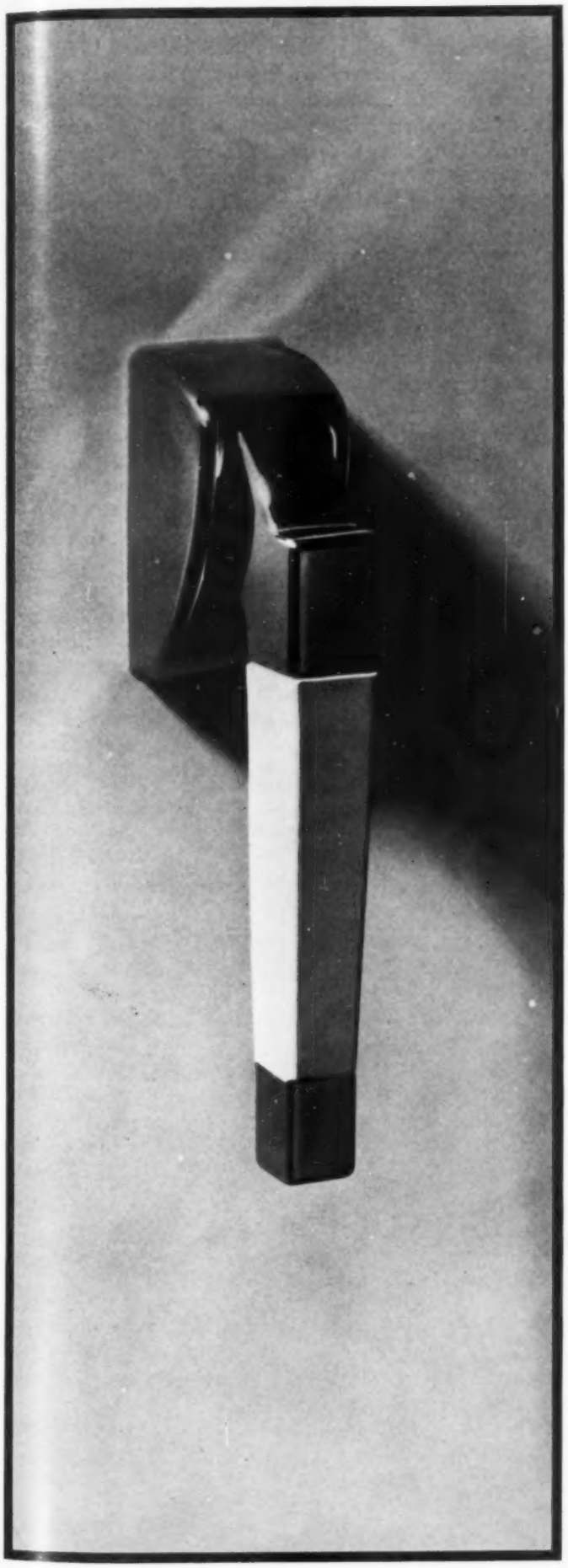
The cast phenolics have gained a wide use in the manufacture of buttons, buckles and other dress ornaments, items of costume jewelry, and similar "style" applications, but they are far from being confined to such uses. They have, in fact, attained even more important uses for such purposes as cutlery and kitchenware handles; knobs, cigar lighters, and fender markers, in the automotive field; in parts of furniture hardware; in a great variety of novelties, clock cases, smoking accessories, and the like; in kitchen, bathroom and refrigerator accessories; in lighting and display fixtures and lamps; in cosmetic containers and vanity, toiletware and related items; in ecclesiastical goods; in many electrical appliances and fittings; in handles for canes and umbrellas; and in a wide range of other products, some of which are not necessarily decorative.

It will thus be seen, that the cast phenolics enter numerous industries and are found today in retail establishments of many types—from department stores to automobile accessory shops and from the finest shops where style is uppermost to the lowly hardware store where utility items predominate.

Although the predominant applications are those in which the beauty of the cast phenolic is of primary importance, other factors, such as smoothness that is pleasant to the touch, freedom from attack by moisture and most other deteriorating factors, permanent lustre, ability to stand up, light weight, good dielectric properties and several other advantages, have an important bearing on widespread use. From a production angle, the ease with which the material can be worked into marketable forms, usually without any considerable investment in tool equipment, counts heavily in many applications. Conversion from the cast or "raw" form into the finished form can usually be done with the same tools used for metal or wood working and does not involve knowledge of molding processes of the heavy presses employed in molding.



Four water clear cast phenolic rods form the stand for this attractive modern lamp, supported at top and bottom by thick square sheets of the same material. All illustrations for this article are shown through the courtesy of the American Catalin Corp.



TENITE

handles are on the new General Electric refrigerators . . . because the unexcelled toughness of Tenite is an insurance against chipping and breaking . . . because the smoothness and low heat conductivity of Tenite make it pleasant to touch . . . and because Tenite can be made to match exactly the gray enamel finish • Tenite is a superior thermoplastic . . . available in all colors, plain and variegated, and in all degrees of transparency from crystal clear to opaque • An illustrated book on Tenite and its many uses will be sent you on request. Write for a copy today.

TENNESSEE EASTMAN CORPORATION

SUBSIDIARY OF EASTMAN KODAK COMPANY

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This conversion usually involves cutting, turning, sawing, carving or some other machine or hand operations such as are done in any wood- or metal-working shop. In a few instances the material is formed or bent without any cutting or may even be shaped to a limited extent by forcing it into a die. In no case, however, is it molded in the way that molding compounds are. In general, therefore, it is not necessary to invest in expensive molds before production in quantity can be undertaken. This is naturally an important consideration in many instances, especially in "style" items which must be produced and disposed of quickly before a vogue changes.

On the other hand, if the shape of the product to be made from a cast phenolic is such that it cannot be cut from a standard bar, tube or sheet with reasonable economy, special molds for casting it into the desired shape may be necessary, and these may require a special form or pattern over which the thin lead shells employed as molds are formed. Again, such machining as is needed may require special tools or special setups of standard tools, for which the customer must pay. If considerable machining is necessary, its cost may offset the cost of molds and molding such as is done on a molded part; hence, when the product happens to be such that either method may be used, both should be considered. It should be remembered, however, that the transparent and translucent colors and other effects readily obtained in the cast phenolics are not duplicated in the molded form.

None of the producers of cast phenolics are fabricators in the sense that they deliver finished products ready for use. The producers furnish only castings, including standard rods, tubes and sheets, and look to their customers for performing such cutting and finishing operations as may be necessary. Thus, the maker of buttons, buckles and other dress ornaments usually buy rod or tubular stock and machines it into the finished article. A maker of smokers' pipes usually buys bits or bowls, or both, cast to approximate size, and then finishes and assembles these parts as may be required. This is analogous to the metal manufacturer buying rods, tubes or sheets of metal and castings made especially to his requirements and then finishing them as necessary for his particular product.

Turning again to the material itself, it should be remembered that this is available not only in several makes—under such names as (cast) Bakelite, Catalin, Joanite, Ivaleur, Marblette and Phenolia—but that there are many grades and in some cases as many as 200 or more standard colors of the same make of material. It is therefore highly desirable, if not absolutely essential, that the purchaser make it clear exactly what he intends to use the cast phenolic for and what this product is expected to do. Some grades of cast phenolic are more water resistant than others, some have special resistance to certain chemicals, some have easier forming properties, some colors are absolutely fast or fadeless than others and at least one type can be dyed whereas most forms cannot. Though some makers match colors from batch to batch with great fidelity, others find it difficult to guarantee close matching. Mottled and grained effects are also difficult to reproduce.

Line of furniture trimmings or hardware produced largely from cast phenolic in attractive and enduring colors, including some marbleized effects

YOU ARE INVITED TO ATTEND THE

FIRST ANNUAL EXHIBIT

OF THE

PLASTIC INDUSTRY

to be held in the Exhibit Hall of MODERN PLASTICS at 425 Fourth Avenue, New York City, from November 15th to December 15th.

★ ★ ★

All types of materials and products, including phenol resins, cast phenolics, ureas, cellulose acetates, laminated plastics, pyroxilyns and caseins will be shown. The exhibit is sponsored by

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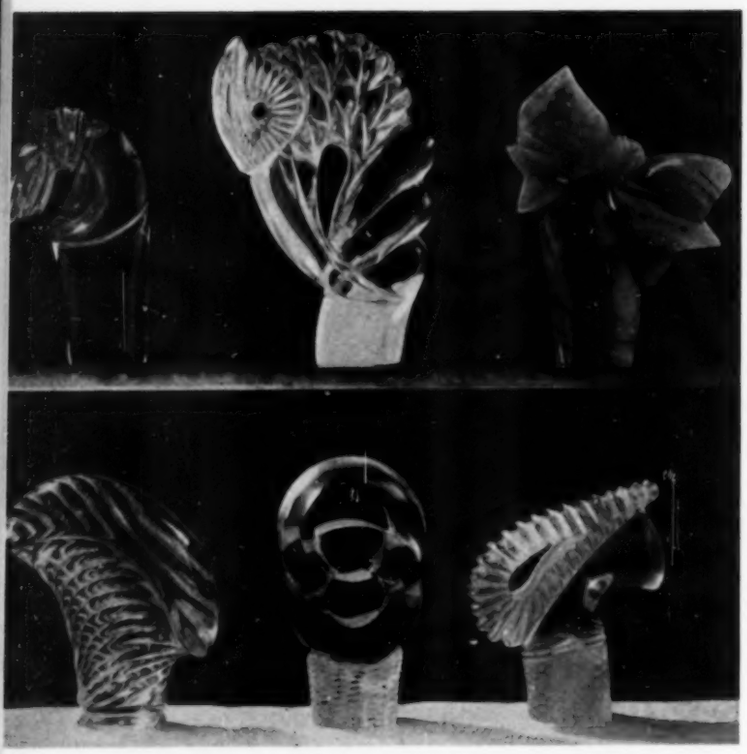
MODERN PLASTICS

425 FOURTH AVENUE

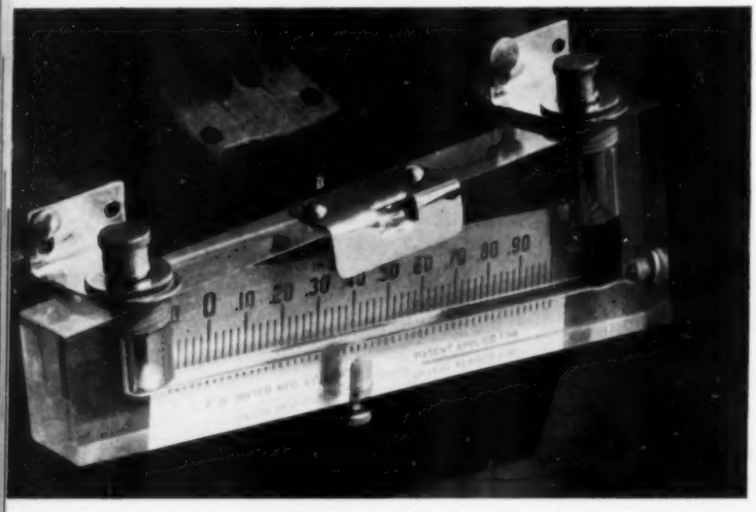
NEW YORK, N. Y.



A beautiful set of crystal umbrella handles formed from cast phenolics. They are stylish, enduring and highly practical and can be had in amber and other tints as well as in clear untinted form

vegetable sources are detrimental. Water absorption is low, but only special forms are recommended for continuous contact with water. Heat, up to about 250 deg. F., may cause some softening, especially of newly cast materials, but such parts as cutlery handles can usually be washed in boiling water without adverse effects if the proper grade of material is selected. Some shrinkage occurs in some grades as the material ages, but when this effect is detrimental it can be eliminated.

Dielectric properties are excellent and compare favorably with the molded phenolics. Strength is about the same as for molded phenolics having the usual fillers, but is below that for the type in which fabric fillers are used. No fillers are used in the cast phenolics, and this among other factors results in their price being higher than for molding types, usually from two to five times higher, depending on the respective grades compared. But the cast form, as already pointed out, usually involves color and transparent or translucent effects not reproducible in the molding form. The higher price of the cast form, however, has confined it almost exclusively to uses in which color and decorative effects are of prime importance. Nevertheless, some estimates place the total production of cast phenolics on a pound basis



A gage, called the Dwyer Carbon Dioxide Indicator, made from clear water-white cast transparent resinoid. The transparency of the material and the fact that it is not easily broken, fit it for some such applications where ornamental effects are of secondary importance

All cast phenolics are non-inflammable, and this factor, in addition to lower cost than the nitrocellulose types of plastic, has resulted in supplanting the latter in many applications, as equally beautiful effects are producible. In addition, the cast phenolics are odorless and tasteless and are quite resistant to moisture, to alcohol and many other solvents, and to many chemicals, including some weak acids and to those contained in most foods. Neither mineral oil nor oils from animal or

Costume jewelry and other decorative and utility items produced from cast phenolic in opaque, translucent and transparent effects

DU PONT

R&H Chemicals

FOR PLASTIC MANUFACTURE

"P.A.C.*" FORMALDEHYDE

U. S. P. solution, containing 37% by weight HCHO. Clear and water-white. Guaranteed full strength and uniform. Modern manufacturing facilities and adequate stocks assure prompt shipments.

PARAFORMALDEHYDE

White powder. Contains not less than 95% Formaldehyde (HCHO.)

HEXAMETHYLENETETRAMINE

Fine powder. If you are interested in the manufacture of synthetic resins, consult us for specifications and prices on the above chemicals.

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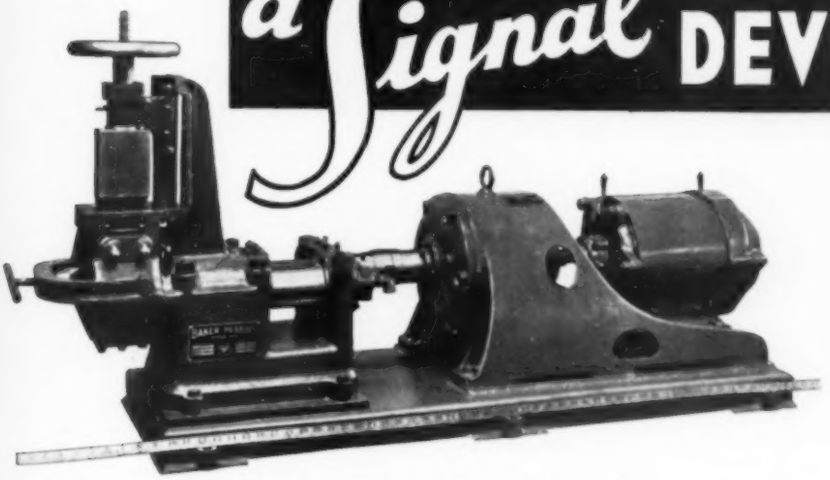

—of Interest to Every Chemist, Engineer and Production Manager

The New Baker Perkins Intensive Disperser, Laboratory Size

Designed especially for the intensive working of synthetic resins, nitro-cellulose and other plastics where the utmost in mechanical working and fineness of dispersion is desired. Temperature of both mixer and rolls easily controlled. Simple discharge, and cleaning quickly effected. Sheeting rolls can be integrally incorporated. Working capacity one pint. We will be glad to demonstrate.

BAKER PERKINS COMPANY, INC. (WERNER & PFLEIDERER DIVISION)
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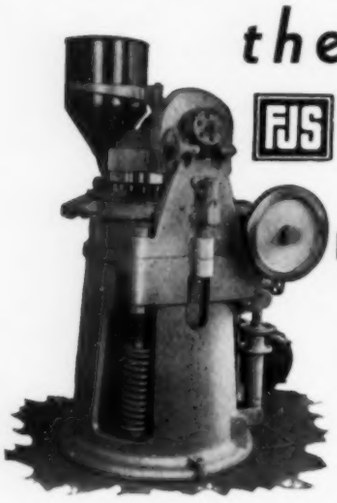
BAKER PERKINS

INVESTIGATE *these* NEW FJS STOKES ROTARY PREFORM PRESSES

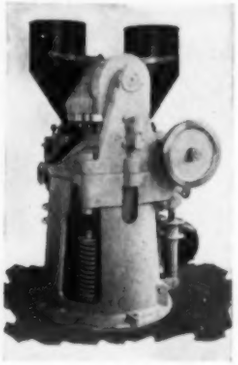


STOKES "DDS-2" Die fill up to 2 inches, maximum preform diameter of 1 1/16 inches, output 350 pieces per minute.

The new press shown above, which replaces the well-known DDS, is ideal for compressing preforms from molding compounds. It is made of semi-steel, is exceptionally rugged, has an improved drive, simplified adjustments, etc. A patented Automatic Pressure Equalizer and Safety Release, acting through springs rather than weights, spills overloads and absorbs strains. It can be quickly "changed over" for different size preforms and while it is primarily a production machine, it can be operated economically on short runs by using as few pairs of punches and dies as the job warrants.

Two other rotary model preform presses are shown below, each being designed for handling certain types of preforming to the best advantage.

STOKES "D-3" Rugged, made of semi-steel, especially suited for severe continuous service in making molding compound preforms. Provided with Automatic Pressure Equalizer and Pressure Release which cushions and equalizes the compressions and prevents shocks and strains. Depth of fill, 1 1/4", maximum diameter of preform 1", output 275–300 pieces per minute.



STOKES "DD-2", replacing the former "DD" model; same design and features as the "DDS-2" (described above) but for larger production of thinner preforming work. Very rugged, made of semi-steel. Applies twice the pressure of the "D-3" model. Depth of fill, 1 1/4", maximum diameter of preform 1 1/16", output 500–600 pieces per minute.

These three presses—and many other models, including heavy-duty single punch types, completely described in Catalog 33-T. Ask for your copy.

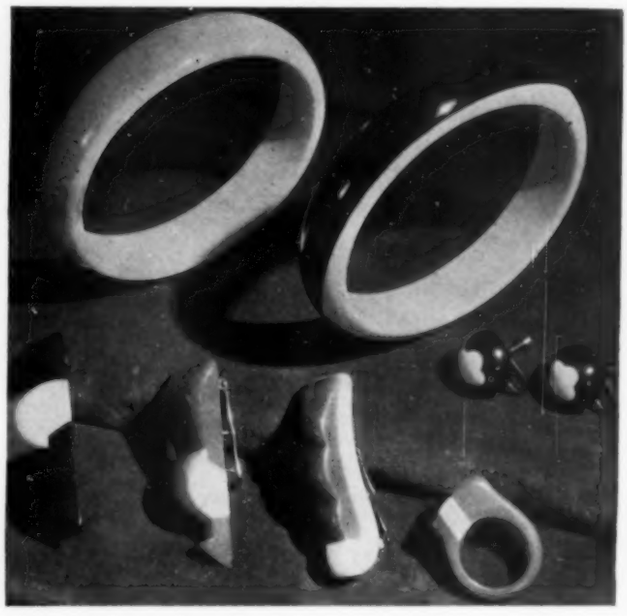
FJS STOKES MACHINE COMPANY

Process Machinery Since 1895

5934 Tabor Road Olney P. O. Philadelphia, Pa.

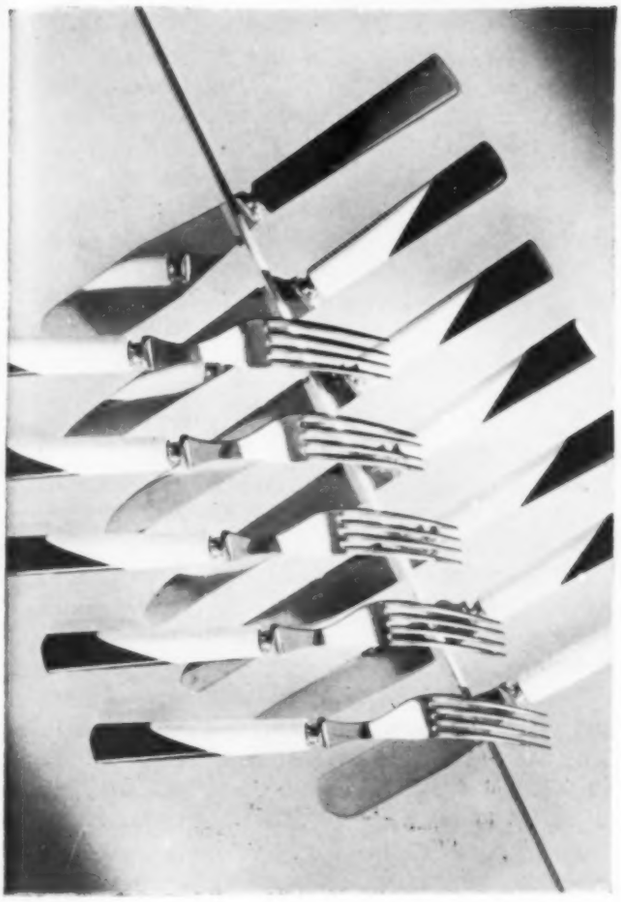
much closer to that for molding phenolics than is ordinarily supposed. The impact strength of the cast form is about the same as that of the ordinary molded forms, hence breakage rarely results from dropping or any common service condition, though the material is not, of course, strictly unbreakable.

As already pointed out, the cast phenolics can be softened by dipping in water or other liquid heated to about 200 to 250 deg. F. and this is done when any forming or plastic flow of the material is required. Thus cutlery handles, after casting, finishing and drilling for the tang, are often heated in a pan of water, after which the handle is forced over the tang. In cooling, the material shrinks tightly onto the tang, and subsequent heating in ordinary service or washing is said not to loosen the handle if a proper grade of material is selected in the first instance. Heat is also applied in embossing and is sometimes recommended when stamping from sheet stock is required. In other cases the shock incident to stamping may shatter the material, so that sawing without heating is sometimes advised when odd shapes are to be cut from a sheet. When forming is done, some materials are heated to about 250 deg. F. by immersion in hot oil. After mending or other forming, the material should be cooled in the die or mold, as otherwise it tends to return to its original shape.



Costume Jewelry made from two-tone cast resinoid. Lines of this class of product have enjoyed a very wide sale, especially through chain-store outlets

Machining operations, such as turning, are much the same as for hard wood, the surface speed being preferably about 280 ft. per minute. Tools are given a negative rake, to prevent biting into the surface. Plenty of clearance is desirable and the tool should be set to give a shaving cut and should be shaped for rapid removal of the shaving. Tools with cemented carbide cutting edges are used to advantage in many cases but are not essential. High-speed steel is also used with an emulsi-



Striated cutlery handles made from cast transparent resinoid and giving very novel colored effects

fied lubricant free of caustic. Lathe cut-off tools can be used for cutting off, but thin, high-speed abrasive wheels are sometimes more economical. Either twist or flat drills can be used for drilling, but they must be ground off, as for brass, to prevent bite. Sanding and grinding is done much as with metals. This can be done wet or dry but if done dry an exhaust fan should be used. Wheels of muslin running in a mixture of ashes and water or fine pumice and water are used at a surface speed of about 1800 r.p.m. (for a 12-in. wheel) for the polishing operation termed "ashing." Buffing is done on muslin wheels running at the same speed as for ashing. Tripoli and polishing wax give a high finish, but finish-buffing is often done on a dry soft wheel. Small articles are often polished in wooden tumbling barrels.

Tapping of holes is done with lubricant if the hole is large although for small screws the self-tapping type work well. Cementing is readily done with special cements usually furnished by the makers of the cast phenolics who, in some cases, also furnish a dipping compound which, for certain work, avoids the need for ashing and polishing.

A goodly proportion of the cast phenolic used is made in the form of round rods or tubes which are furnished in short lengths up to about 22 in. long but often much shorter. These are always slightly smaller

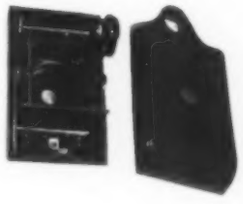
HALF A CENTURY OF

MOLDING EXPERIENCE

LIES BACK OF THIS

TOASTER BASE

Molding has developed so fast in the last few years, that many think all molders new at the game. Remember then, that no tyro could have the knowledge, the experience and the ability to produce moldings of Tech-Art quality . . . moldings such as this intricate toaster base, done by Tech-Art for the Proctor and Schwartz Electric Company.



Remember too, that though Tech-Art boasts nearly fifty years of experience . . . we have kept our organization young in spirit . . . modern in attitude and in equipment.

That is why the leaders of industry come to Tech-Art for moldings of the finer sort. Knowing these things, you too can rely upon Tech-Art aid in your molding problems. Write or 'phone us and a representative will call.

TECH-ART PLASTICS CO.

Boonton New Jersey and 40-36 22nd Street Long Island City, N. Y.

SUCCESSOR TO BOONTON RUBBER CO.

QUALITY
ARPCO
PRODUCTS

MOLDING equipment manufacturers have always produced long-lived machines. Yet recent advances in design and construction have made many of their older models obsolete from the viewpoint of operating efficiency.

It is a source of particular pleasure to ourselves, of profit to our customers, to know that the Ackerman plant—because of its completely modern equipment—is prepared to quote on the basis of one of the lowest operating cost factors in the industry.

Moreover, because of our new equipment, our trained personnel, our skilled design and engineering staffs, those we work for are assured of perfect workmanship, perfect molding on every piece produced.

This dual Ackerman advantage suggests, irresistibly we hope, that you call upon this organization for quotations and advice on your current molding problems.

THE ACKERMAN
RUBBER & PLASTIC
MOLDING COMPANY
986 EAST 200th ST. CLEVELAND, OHIO

at one end than at the other, as a draft of 0.010 to 0.300 in. in the length of a tube is necessary to free it from the lead shell in which it is cast. Tubes or "cylinders," as they are often termed, have a minimum wall thickness of $^{3}/_{16}$ in., and a minimum hole of about $^{7}/_{16}$ in. Besides round rods and tubes, many are cast in square, hexagonal, fluted and other shapes. Tubes, such as those used for making dress buckles, may have two holes of almost any desired shape, and the outside may be elliptical, oblong, or almost any shape wanted. Rods and tubes are often cast in odd shapes and subsequently sliced off in pieces of almost any desired thickness. This wastes little material and provides a large variety of contours effective in design.

At least one manufacturer makes tubes and rods in sections having two colors. Thus, the flutes in a fluted rod or tube may be filled by casting more material of a second color around it in a subsequent operation or one section of a rod may be cast in one color and subsequently an adjacent section in another color, so that a striated effect is had when a piece is cut from the rod.

Pieces of odd shape, especially such parts as pipe bits and pipe bowls, cutlery and kitchenware handles, lamp pedestals and the like are frequently cast to substantially finished size and shape, so that almost no material is wasted in machining. This requires more or less "special" molds, though for some pieces used in large quantities, such as cutlery handles and pipe bits, stock molds may be available. Such molds must always be cast with the draft one way so that they may be quickly freed from the lead shell and the latter freed from the form over which it is produced. Blanks for hand mirrors and brush backs can be cast individually in this way, and the same is true of many other items.

Sheets are cast in shallow trays in a minimum thickness of $^{1}/_{8}$ in. They are not cut from slabs, as in the case of some cellulose products. They may vary somewhat in thickness and do not always have a smooth surface. There are several more or less "standard" sizes of sheets and they can be had in thickness up to one inch or more. Many special sizes are available and some have been made as large as 18 by 50 in. Articles such as clock cases are sometimes made by casting tubes with an irregular contour—the same as the outside of the case—and then cutting this tube off in lengths equal to the thickness of the case. Front and back plates may then be cemented or otherwise fastened in place. Cored cases with integral fronts can also be cast.

After castings are poured from liquid resin, the latter must be cured—usually from about three to seven days—in ovens designed for the purpose. This naturally has an important effect on production time and cost, though when production on large orders is once started and the casting begin coming from the ovens, the production may continue up to the capacity of the ovens in daily or more frequent batches, aggregating in some instances several tons a day. In the case of stock sizes and colors, immediate delivery can be had.

Prices naturally vary with (*Continued on page 58*)

For **PLASTICS** *of Uniform Quality*

FINE HEYDEN CHEMICALS

FORMALDEHYDE
PARA FORMALDEHYDE
HEXAMETHYLENAMINE

Use **CHEMICALS** *of Uniform Strength*

HEYDEN
CHEMICAL CORPORATION
50 UNION SQ. NEW YORK. N.Y.
180 N. WACKER DR. CHICAGO. ILL.
factories
GARFIELD, N.J. PERTH AMBOY, N.J.

These products meet the most exacting requirements. They have the purity and uniform strength so vital in the production of Plastic materials of dependable, uniform quality.

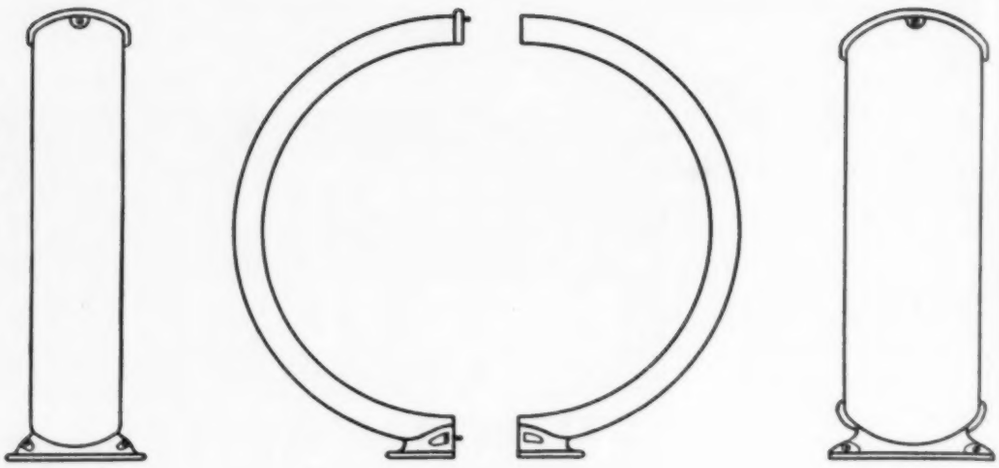
COLTON Preforming Machines have won wide usage because of their inherent sturdiness, their uniform, speedy and satisfactory performance.

Note the new, improved 5½ Tablet Machine shown at right. The solid steel frame insures perfect operation; the improved die fasteners, improved cam construction, heavier ejecting arm brackets and vanadium steel plunger make possible high speeds without fear of breakdown or lowered quality. In every particular, we believe, this machine is by far the finest the market has to offer.

The 5½ Tablet Machine makes tablets up to 3" in diameter and having a fill depth of 2⅛". Other Colton Preforming Machines—single punch, multiple and rotary—are likewise outstanding in construction and performance. Write for literature on these machines or have our engineers visit your plant—

ARTHUR COLTON CO.
DETROIT, MICHIGAN

COLTON DETROIT



These cuts show the method of frame assembly made possible by the use of urea-formaldehyde discs in place of easily broken glass globes. Three screws hold the two discs in place—release them easily for change or cleaning

TRANSLUCENT PLASTICS REPLACE GLASS GAS-STATION GLOBES

ONE MORE achievement has been added to the long list of urea-formaldehyde conquests over fragile glass. This time, in gas stations throughout the country, colorful, translucent Urea frames, in a simple assembly, replace the heavier, easily shattered glass globes formerly used.

When glass globes were used, a large breakage occurred, due to the expansion and contraction of the glass. The light burning within tended to heat the glass to a degree, so that a sudden shower would cause uneven contraction. Checking would frequently result and repeated exposures—which in the very nature of gas station usage were impossible of avoidance—would develop complete breakage.

Breakage also was frequently caused by the pressure of the screws of the metal holding fixture upon the base of the globe. Again, the fragile nature of the glass lead to much destruction incident to the periodic cleaning essential to any exposed object.

A Capcolite sign used by the Texas Company. This and the above illustration shown through the courtesy of the Cincinnati Advertising Product Company.

The New Capcolite globe, made of Plaskon, has none of the shatterable quality of glass. It resists the triple threat of breakage because, unlike glass, it is semi-rigid.

Yet, possessing all the translucent qualities of glass, it makes an ideal lighted sign, clearly visible from great distances, brilliant in its coloring.

Capcolite globes provide yet other types of saving impossible with other materials. Thus when oil companies change the names of their brands—a practice they have been much given to since the advent of the super-extra-plus

Ameroid

CASEIN PLASTICS

SHEETS and RODS

- Non-inflammable
- Made in beautifully mottled and plain colors

American Plastics Corporation

50 Union Square New York

KESSCO PRODUCTS

Acetone C P
Methyl Ethyl Ketone
Ethyl Acetate
Butyl Acetate, Nor. & Sec.
Butyl Alcohol, Nor. & Sec.
Amyl Acetate: Standard, High Test, Secondary, and Special Grades
Amyl Alcohol
Refined Fusel Oil
Butyl Propionate
Butyl Stearate
Phthalates:
Dimethyl Dibutyl
Diethyl Diamyl
Acetine
Diacetine Triacetine

The Kessler Chemical Corporation has always confined its manufacture to solvents and plasticizers and is not offering lacquer or intermediate products.

SOLVENTS PLASTICIZERS

for the

PLASTIC AND CHEMICAL INDUSTRIES

The Plastic Products Industry has created a demand for plasticizers, softeners and solvents with properties meeting special requirements. In addition to our regular plasticizers such as the

PHTHALATES—STEARATES—TRIACETINE

we are producing special products to meet these needs. Our technical and manufacturing experience may solve your problem: we offer our cooperation.

K 403

THE KESSLER CHEMICAL CORPORATION

11th Ave. & 26th St. B. & O. Bldg. New York, N. Y.

Subsidiary of the

AMERICAN COMMERCIAL ALCOHOL CORPORATION

Take your cue from the Corning Glass Works, whose Pyrex dishware enjoys unique consumer and dealer acceptance. Corning goes beyond the mere decision to use molded plastics. They carry their plans to the logical conclusion . . . choose their molder as carefully as they do their materials. They put Diemolding under a microscope before we made the handle shown above—and we liked it that way. Our plant, our record, our personnel—all three are open to your severest inspection, because they are the type that can stand inspection. Put your dogs on us . . . we like it!

DIEMOLDING
CORPORATION
CANASTOTA, NEW YORK

Domestic

WOOD
FLOUR

•

Bright in Color,
Uniform Screen Analysis

•

BECKER, MOORE & CO., INC.
(*Largest Manufacturers*)
North Tonawanda, New York

era—they find it much simpler to change the reading faces of their globes when they are urea products than when they are made of glass. Here, too, they eliminate a large breakage factor formerly present.

In transportation—an important factor when you own a few thousand gas stations with five to fifty globes in each—the new type again offers distinct economies, not merely in reduction of breakage but in a triple reduction of shipping costs—first, because of the lower weight of plastic globes—second, because of the smaller amount of material to be shipped (two globe-panels rather than a single, large, bulky globe)—and third, because of the lowered amount of packing material needed to adequately protect the new-type fixtures.

These new plastic globes have, in a short period, achieved wide usage. Their ready acceptance in the gasoline field (where a few companies exercise control over a vast majority of stations) presages the forthcoming popularity of translucent plastics as lighting fixtures for many varied outdoor and indoor purposes.

CAST PHENOLICS---THE JEWEL-LIKE PLASTICS

(*Continued from page 54*) quantity supplied, and producers prefer production in full kettle lots of a given type and color of material, a kettle generally holding around 750 lb. Much smaller lots are often furnished, however, especially when stock colors are used or when the run happens to be such that several orders can be filled from a given batch of the resin. List prices vary from about 60 cents upward per pound for standard translucent or opaque colors and run around 70 cents per pound for standard transparent colors or clear. Discounts depend on quantity taken in a given period. Special types and shapes of material are naturally more costly, and special molded shapes tending to increase cost, at least to the extent of the special molds.

Machining of such items as buttons, beads and certain types of dress ornaments and jewelry can often be handled on machines specially designed for the purpose with great speed and economy. Almost equal results can be had with some forms of standard automatic screw machines designed for turning, drilling and similar operations. Producers of cast phenolics are naturally in a position to advise on the most economical methods of production and on the preferred types of machine for particular types of work.

From the foregoing it is evident that the cast phenolics have a wide range of usefulness. They give promise of still wider application, especially as some of the large producers of other types of plastics are beginning to take up their manufacture and will doubtless do much to promote their sale, along with those companies which now produce in large quantities. At least one of the latter is now furnishing a liquid type of casting resinoid for coating and impregnating wood and imparting to the wood a surface and appearance much like that of products made from cast phenolics.

SEEING IS BELIEVING

You can't use the big bank account or the great reserves of a Plastic Manufacturer to mold difficult articles or to stop sticking, staining and other troubles, but you can overcome these troubles by using

MAKALOT PRESS POWDER

No changes in your molding methods are necessary, although MAKALOT requires less *heat, pressure* and *curing time* than any other phenolic molding compound.

QUICK CURING

qualities so much desired in these days of strenuous competition, are secured by the use of MAKALOT because our resins have a very low melting point.

FREE FLOWING

Your molds will close more quickly and MAKALOT'S superior flowing qualities make it possible to do the hitherto impossible in molding large and intricate articles.

MOLD STAINS AND STICKING

which are caused by the use of inferior chemicals in making molding resins are not encountered by users of MAKALOT Molding Compounds, including Shock Resisting, Low Loss, Arc Resisting, High Heat and a complete line of colored and standard materials.

RICHWARE

An excellent material for dishes, kitchen and table ware in beautiful pastel and permanent colors withstands boiling water, is tasteless and odorless.

MAKALOT CORPORATION

262 Washington Street, Boston, Mass. FACTORY: Waltham, Mass.
Manufacturers of Molding and Paper Impregnating Resins, Lacquers, Varnishes and Cements

HEADQUARTERS FOR

PLASTICIZERS, SOLVENTS AND RAW MATERIALS

For the Manufacture of
PLASTICS, LACQUERS—and COATINGS

The following are some of our specialties:

Cellulose Acetate
Dimethyl Phthalate
Triphenyl Phosphate
Dibutyl Phthalate
Dibutyl Tartrate
Cresylic Acid
Diethyl Phthalate
Triacetin
Sodium Acetate
Acetic Anhydride
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AMERICAN-BRITISH CHEMICAL SUPPLIES, INC.

180 MADISON AVE., NEW YORK, N. Y.

Telephone, Ashland 4-2265

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★ KAY-FRIES CHEMICALS, INC.
(*Manufacturers of Organic Chemicals*) West Haverstraw, N. Y.

★ CHAS. TENNANT & CO. (Canada) LTD.
372 Bay Street, Toronto 2, Canada

Importers

Wood Flour

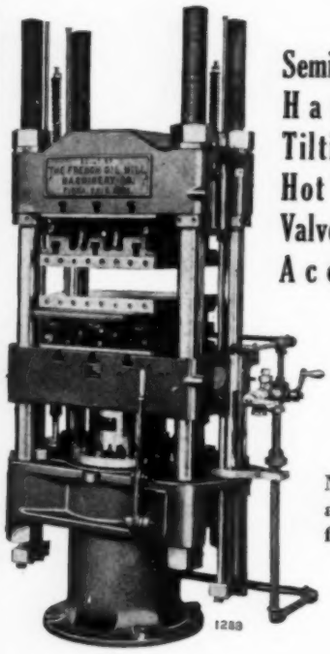
FOR COMPOSITION MOLDING

Various Grades

From 25 to 100 Mesh
Suited to Your Own Formulas

STATE CHEMICAL COMPANY
80 West Houston St.
New York City

French Hydraulic Machinery



Semi-Automatic Presses
Hand Presses
Tilting Die Presses
Hot Plate Presses
Valve Control Pumps
Accumulators

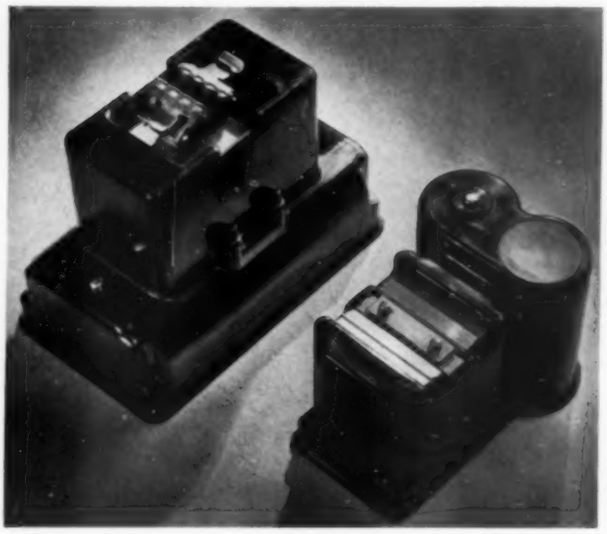
Molding Presses of all sizes and types for all compounds

***The* French Oil Mill Machinery Co.**
Piqua, Ohio

NEWS AND DEVELOPMENTS

Rahm Engineering Company, 71 Rutgers Street, Belleville, N. J., offers consulting services consisting of special machinery design, experimental equipment, machine work and appraisals as relating to plastic molding plants. The company is prepared to furnish the complete molding plant from power house equipment to the finished molds and the servicing thereof for molding all of the modern phenol resinoids.

W. E. Rahm, former chief engineer and vice president of the Burroughs Company and the Burroughs Engineering Company, is president; L. F. Rahm, assistant Professor of steam engineering, Princeton University, and the author of "Plastic Molding," is associated with this company.



The Olympic Industrial Corporation has developed this sharpening device for knives, as well as razor blades. The items shown are battery powered, though special models are available for A. C. operation. All models are housed in handsome molded cases. Photo courtesy Bakelite Corporation.

STANDARDS FOR ELECTRICAL INSULATING MATERIALS

As a result of recommendations made by its Committee D–9 on Electrical Insulating Materials, the American Society for Testing Materials has accepted revisions in a number of the standards covering electrical insulating materials. Since a procedure for determining the impact strength on materials less than $^1/_2$ in. thick (the former specimen thickness) by testing a $^1/_2$ in. "pile-up" of thinner specimens has been found by an extensive cooperative study to be satisfactory, the Methods of Testing Electrical Insulating Materials for Resistance to Impact (D 256–34 T) will now include the new procedure.

Based on studies extending over several years, a method of testing both flexural strength and impact strength of molded insulating materials on specimens

less than $\frac{1}{2}$ in. thick has been developed. This was approved as a tentative revision of the Standard Methods of Testing Molded Materials Used for Electrical Insulation (D 48–33).

Several years of successful use by a number of laboratories and study for a shorter period by several more has led to the drafting of a Rockwell hardness test which has been incorporated in the methods of testing laminated sheet materials (D229–32 T).

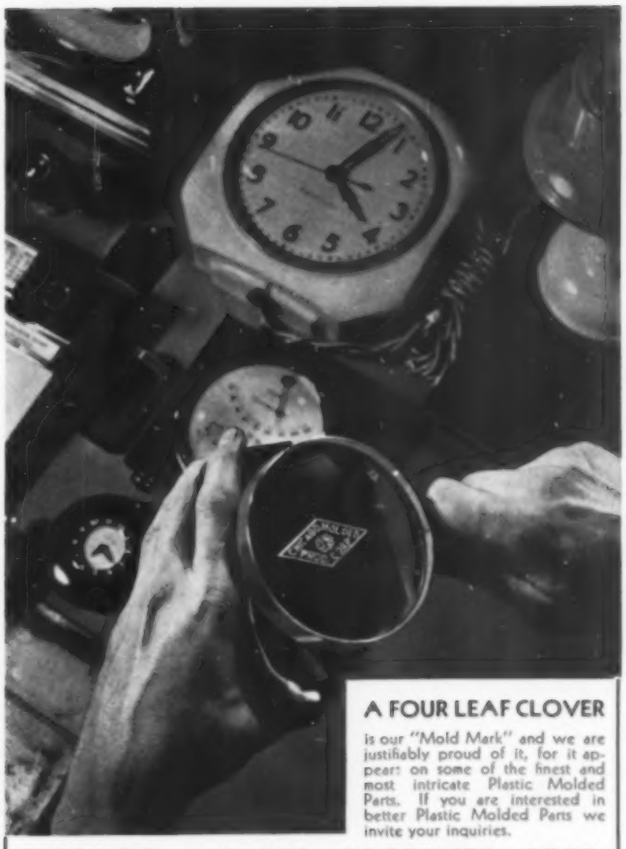
Lido Luggage Company now uses this Amerith handle for its traveling bags. Advantages over the usual leather: freedom from sweating and staining, freedom from breakage caused by rotting of leather or rough handling, ease of carrying because of smooth, seamless construction. Photo courtesy Celluloid Corporation.

NEW DIE AND MOLD MACHINE

A duplicating machine for reproducing plastic molds and small dies used for die-castings and small drop forgings has been placed on the market by the George Gorton Machine Company, Racine, Wis.

Manually operated, the new machine consists of a vertical miller equipped with a tracing arm at right of cutter spindle, and a special table mounted on top of the standard milling machine table, running on compound ball bearing slides.

The duplicator, which introduces a new method for die reproduction, is designed for small, accurate work of irregular shape and will cut deep serpentine grooves, sharp shoulders, steep angles and difficult shapes generally, also lettering for special trade marks. High spindle speeds (up to 12,000 r.p.m.) permit the use of cutters down to twenty-five or thirty thousandths diameter. For roughing out dies, the duplicator table can be locked and movement obtained with the milling machine table screws. For such work, cutters up to $\frac{1}{2}$ in. dia. shank can be utilized. Duplicator head and table are quickly detachable, thus providing a standard milling machine driven by $\frac{1}{3}$ horse-power ball bearing vertical motor with suitable starting equipment. Single speed motor equipment provides optional high or low speed range (475 to 3500 r.p.m. or 950 to 7000 r.p.m.).



A FOUR LEAF CLOVER

is our "Mold Mark" and we are justifiably proud of it, for it appears on some of the finest and most intricate Plastic Molded Parts. If you are interested in better Plastic Molded Parts we invite your inquiries.

CHICAGO MOLDED PRODUCTS CORP.
2142 Walnut St. Chicago, Ill.

WOOD FLOUR

MANUFACTURED FROM FINEST QUALITY NEW ENGLAND WHITE PINE

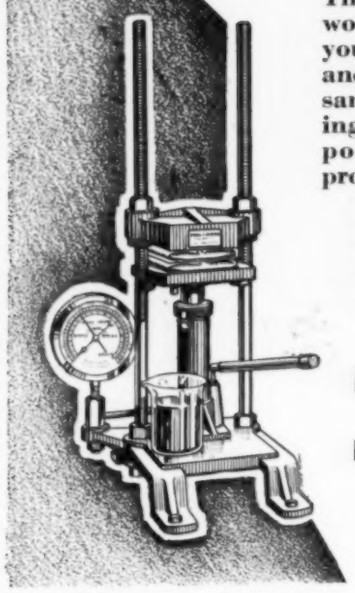
THE MOST DESIRABLE FILLER FOR PLASTICS

Select Color — Uniform Grades

New Hampshire Wood Flour Co.
Concord, N. H.

The CARVER LABORATORY PRESS

KNOW THE FUTURE ADAPTABILITY of YOUR PRODUCT



This press enables you to work out new uses for your product, test molds, and materials, make up samples—perhaps opening up greater sales opportunities for your products.

Small but powerful, equipped with hot plates—connects to lamp socket—Write for catalog.

FRED S. CARVER
ESTD. 1912

Hydraulic Engineering and Equipment

343 HUDSON ST.
NEW YORK

NORMAL — CONCENTRATED PROCESSED

Heveatex

RUBBER LATEX

A reliable source of Supply and Service. Ample stocks for immediate delivery. Investigate our new Powdered Rubber for plastics and adhesives. The cooperation of our technical staff in selecting the most suitable form of latex for the results desired is available without obligation. Correspondence invited and treated in confidence.

HEVEATEX CORPORATION
78 GOODYEAR AVE., MELROSE, MASS.

A NEW PROCESS FOR MARKING PLASTIC SURFACES

THOSE who are faced with the necessity of marking panels or parts fabricated from phenol resin, fibre, hard rubber or similar hard surfaced materials economically in quantity will be interested in a new process developed by the Synthane Corporation of Oaks, Penna.

This new method, called the "Synthographic" process, makes it possible to produce clean cut reproductions of trade marks, symbols, letters, scales, etc., on laminated plastic or similar surfaces at a low cost in quantity. While the process is not engraving, the results are said to compare favorably with engraving for clearness, sharpness and permanency. As a matter of fact, effects can be produced which would be impossible or at least impracticable by engraving; for instance, the application of colors or combinations of colors or highly ornamental designs.

NOTES FROM GREAT BRITAIN

THE British plastics industry while a comparatively new one is nevertheless healthy and vigorous and progressing so rapidly as to leave no doubt that before many more years are over it will be one of the most important industries in the country.

London and Birmingham have hitherto been regarded as the principal centers in Great Britain for plastics but the North of England has recently become more actively interested. This is to be expected for in that area there are numerous large engineering firms making presses, molding machinery, electrical equipment and rubber products. Also it is the largest tex-

tile manufacturing center in the world as well as an important coal producing and chemical manufacturing area.

On Sept. 28, 1934, the North of England became officially recognized as a plastics center as on that date a northern section of the Institute of the Plastics Industry was inaugurated with headquarters at Manchester. The Institute now has three sections: one in London, one in Birmingham and one in Manchester, so all the industrial areas of the country are now covered. Apart from its importance as a manufacturing center the area around Manchester is densely populated and is thus a valuable market.

In connection with the general position of plastics in Great Britain there appears to be room for a great deal of development in the laminated sheet side of the industry. So far little use has been made of laminated sheets for such purposes as decorative paneling, and although there is certainly a market little attempt has been made to exploit it. In fact laminated sheet has been imported from the United States for installation aboard ships built in England. But this has occurred only rarely.

One or two manufacturers have supplied laminated sheets for decorative purposes but only in small sizes, and development has proceeded not nearly so far as has been the case in the United States or even on the continent of Europe.

In the matter of moldings in general, however, British manufacturers maintain that they have nothing to fear from competition outside their own country, and as the industry is largely in the hands of persons pursuing a vigorous policy they have some reason for their belief.

HERCULES TO MANUFACTURE NEW COATING MATERIALS

Hercules Powder Company will begin shortly on the construction of a new plant at Parlin, N. J., for the manufacture of Tornesit, the company's new protective coating material. With the opening of this plant, Tornesit will be produced in this country for the first time, replacing the material now being imported from Germany.

Tornesit is a chlorinated rubber product that is rapidly finding use in the protective coating industry because of its great resistance to acids, alkalies, fumes, and other destructive elements. Tornesit is also being used for adhesives and plastics and as an impregnating material for textiles and paper.

The Patterson Foundry & Machine Company of East Liverpool, Ohio, announces its new "Porox 66," a new synthetic silicate grinding ball which is used as the grinding media with pebble, ball and tube mills. It is claimed that this ball is so tough that it will not split, chip or fracture and so hard that it offers greater resistance to abrasion than any type of grinding media yet developed.

ANYONE CAN BUY A MOLDING PRESS BUT...

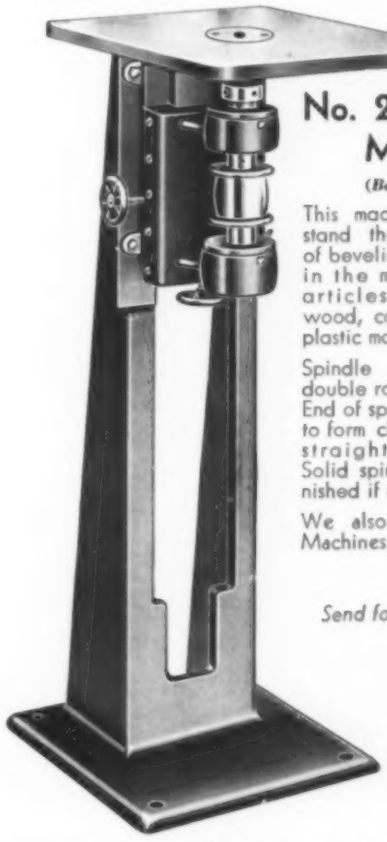
It takes more than equipment to meet today's molding demands. At the Kurz-Kasch plant, we back up the most modern equipment with a staff of designers and molding engineers which has worked together for fifteen progressive years. That they have learned the secrets of fine and economical molding, you may judge by their list of clients, their record of outstanding performance.

The KURZ-KASCH COMPANY

NEW YORK DAYTON, OHIO CHICAGO
CLEVELAND LOS ANGELES DALLAS ST. LOUIS
MINNEAPOLIS TORONTO, CANADA

MOLDERS OF PLASTICS

Visit our display at the First Annual Exhibit of the Plastics Industry at 425 4th Avenue, New York City, Nov. 15th to Dec. 15th



No. 2B Beveling Machine

(Ball Bearing)

This machine is built to stand the heaviest kind of beveling and rounding in the manufacture of articles from celluloid, wood, catalin and other plastic materials.

Spindle is mounted in double row ball bearings. End of spindle is split so as to form chuck for holding straight shank cutters. Solid spindle can be furnished if desired.

We also make Beveling Machines in other sizes.

Send for Catalog "E"

We make a complete line of Machines, Tools, Dies & Molds for working Celluloid, Catalin, Tenite & similar plastic materials.

STANDARD TOOL COMPANY

73-75 Water Street Leominster, Mass., U. S. A.

The Newark Die Co. has specialized for sixteen years in the engineering and manufacture of molds for plastic materials, in Die Sinking, Engraving and Hydraulic Hobbing. Keller-equipped, ours is one of the most modern and best equipped shops in the state.

Place your mold making problems in the hands of this experienced, well recognized and financially responsible concern.

Newark Die Co.

INCORPORATED

24 SCOTT ST. NEWARK, N. J.

HOW DO YOU HOLD IT?

Many people ask us, "How on earth do you get all your business?" But the more important question is, "How do we hold our business?"

We find our clients long-lived because they find us able to do their work just a little bit better . . . . an ability arising from our unique combination of modern ideas and modern equipment with long experience dating back to the early years of the molding industry.

Investigate!

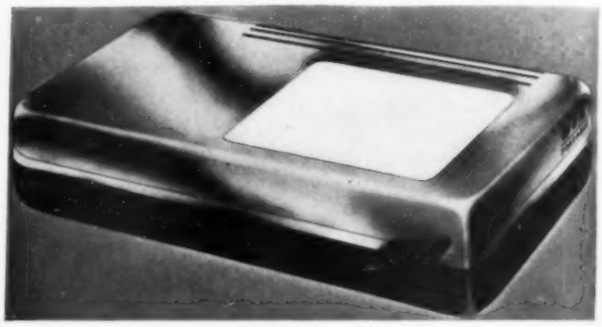
AMERICAN INSULATOR CORP.

New Freedom, Pa.

SALES SLIP REGISTER USES MOLDED HANDLE

REDESIGN OF WIZ stationary and portable sales slip registers, plus an intensive introductory sales effort which commenced in August, have brought the American Sales Book Company of Niagara Falls a rapid increase in sales with present indications that a new sales record will be set by the three hundred representatives of the company.

The need for rejuvenation of a line which was lagging in sales, according to Robert P. Templton, general manager, prompted the American Sales Book Company to turn to Walter Dorwin Teague to redesign its two lines, stationary and portable.



The portable register was so completely redesigned as to be almost a new product. As with the stationary model, practicality was used, whenever possible, as a design element. In order to make it easier to hold the portable register in the left hand, the left edge was fluted, thus giving the palm, thumb and index finger a firm grip. These flutings were made an element of the design. Likewise the black crackle-finish lacquer on the bottom half of the portable series for a better grip contrasts effectively with the lacquered surface of the aluminum top which must be smooth to the touch of the hand to facilitate writing yet not tarnishable from perspiration. The handle of this portable register is of molded phenol resin.

The portable machines have opened up a field of use among professional men and executives who, by substituting ordinary memorandum paper for the usual printed forms, keep the register on their desks and use it as a memo pad. The first copy goes to the party addressed. The second, or carbon, the executive's secretary keeps as her follow-up. The third copy (carbon) is retained in a locked compartment in the bottom of the register and serves as the executive's check on both his secretary and on the party who was ordered to do a job.

H. Bennett is no longer actively connected with The Glyco Products Company, Inc., but will continue to act in an advisory and consulting capacity. He is now director of The Chemical Publishing Company of N. Y., publisher of "The Chemical Formulary," Volume I, and "Practical Everyday Chemistry."

All-Nickel vacuum extractor, made by F. J. Stokes Machine Company, for use in manufacturing plastic materials of the catalin type

SCIENCE MAKES JEWELRY FROM CARBOLIC ACID

Throughout the ages men have sought futilely to transmute baser metals into gold. Now modern chemistry, while still unable to bring to realization this ancient dream of the alchemist, has performed a miracle almost as great. It has succeeded in transforming carbolic acid into jewelry and a thousand other products.

The familiar household antiseptic, known to industry as "phenol," is one of the important basic ingredients of catalin, a new plastic material, containing also formaldehyde and other highly refined chemicals. It was discovered a few years ago by chemists seeking to create a synthetic rubber. While the original quest was not successful at the time, the discovery of catalin was a result of almost equal importance.

Produced in a wide variety of colors and combinations of colors as well as in transparent form, catalin is a hard, non-inflammable, entirely non-poisonous material of great strength. It is widely used for such jewelry items

Catalin ingredients, even in their raw state, must be protected against iron contamination. This tank car for transporting phenol is made of Nickel-clad steel with pure Nickel heating units

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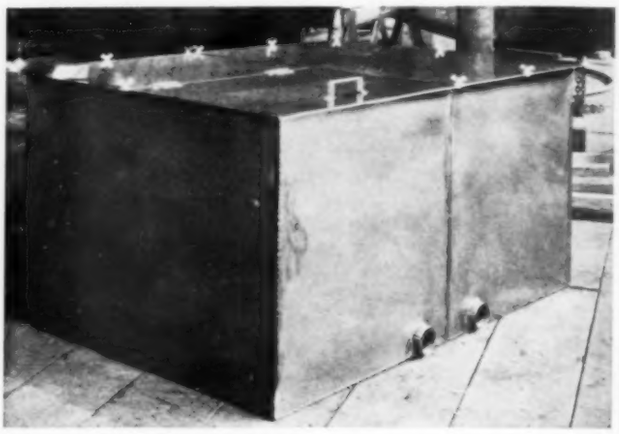
as bracelets, beads, pendants, and the like. Besides these it has many other applications, including pipe stems, cigarette holders, chessmen, handles for cutlery, household utensils and other tools, clock cases, automobile hardware, door knobs, parts of electric toasters, waffle irons and toilet articles.

Known technically as a cast phenolic resin, catalin in its original state is similar in constituency to golden clear honey. To facilitate handling in the initial stage of production, the raw phenol, which melts at a temperature of 109° F., is heated to a liquid state and pumped into tank cars made of Nickel-clad steel. At the catalin plant, Nickel heating units, inside the tanks,

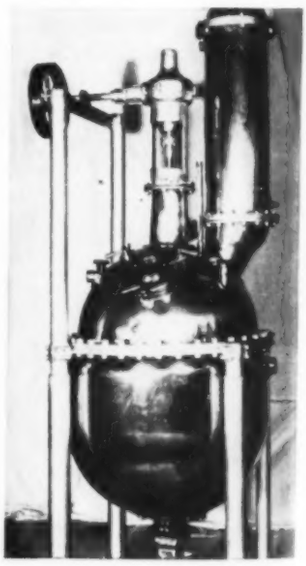


This two-compartment Nickel tank was made by the Buffalo Tank Corporation for handling phenolic resin in a large American plant

remelt the phenol so that it can be pumped into Nickel reservoirs—also heated—to be ready for subsequent processes.

These operations are carried out by secret methods in mixing tanks, pressure cooking kettles, condensers and other equipment made to special design, utilizing Nickel for all parts coming into contact with the ingredients. After mixing, the liquid catalin is poured into molds and placed in a curing oven, where, subjected to uniform temperature over a definite period of time, the catalin becomes solidified. After cooling it is removed from the molds and is ready for machining.

The coloring of catalin, being part of the basic ingredients, goes clear through. It can be made (*Continued on page 68*)



Water-jacketed processing kettle with inside jacket, agitator, and reflux condenser of pure Nickel. Made by Van Alst Metalsmiths Company, it is of a type in general use in synthetic resin plants

PLASTICS AS FUNDAMENTAL MATERIALS

(*Continued from page 25*) ations produce the new cover of molded plastic; molding, removing fins, and buffing. The molded box is light in weight, reducing shipping costs, yet tough enough to withstand all normal use, and its finish never wears through to a contrasting color beneath.

The New Todd Protectograph with square plastic keys of black and white Plastics were chosen for smoothness of finish and superior wearing qualities

The handset and bell cover are parts most frequently seen by telephone users, but molded plastic is widely used in the telephone plant for a great variety of less conspicuous parts, such as jack mountings, non-metallic coil spools, and test strips. Where telephone apparatus is subject to accidental "flash over," that is, arcs permitted by the accumulation of foreign conducting material on the surface, hard rubber, or other insulating property, is necessary for permanent maintenance and is inset in the plastic at the time of molding.

Perhaps no organization has experimented with molded plastics to any greater extent than Bell Laboratories to whom we are indebted for information, and for the photographs of telephone equipment.

The use of plastics by Bell undoubtedly provides the best illustration of the point which Mr. Dreyfuss has made with reference to plastic uses—that is, they should be considered as a fundamental material and their possible uses should be determined on the same basis as metal or wood.

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* *Illustration above shows sample book cabinet produced for The Hollis-ton Mills, Inc.*

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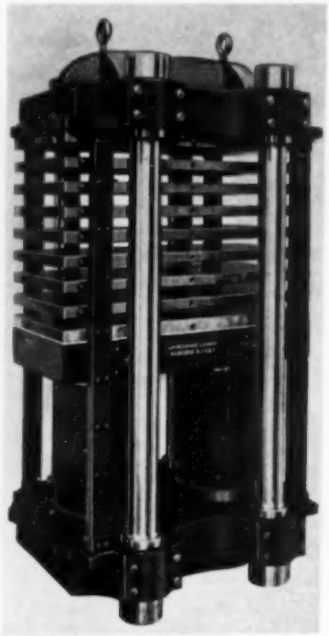

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SCIENCE MAKES JEWELRY FROM CARBOLIC ACID

(*Continued from page 66*) to show the light in jade and rose quartz, the sparkling of emerald, the black of ebony and the many tints of modern pastel colors. Besides being non-inflammable, it is odorless, tasteless, and resistant to acid corrosion. It can be machined and worked more readily than any other plastic material and is handled similarly to metal or wood.

Such operations as turning, drilling, filing, milling, tapping, engraving, and the like can be performed without difficulty. It also can be polished to a high permanent lustre. New items in catalin can be produced on short notice, for molds, patterns and color changes can be made easily at slight expense. Catalin is marketed as the "gem of modern industry."

PHENOLIC BEARINGS SOLVE DIFFICULT PROBLEMS

(*Continued from page 22*) long periods in contact with parts that will rust, of course, but water does not in any case injure the phenolic bearing.

The success of the phenolic bearing in steel mill work has led to its use also in paper mills, cement mills, rubber mills and in certain types of textile machinery, especially where water or chemicals are likely to cause trouble with metal bearings or with their lubrication. The phenolic bearings withstand heavy loads and do not cut the shaft or cause it to wear as rapidly as with the usual plain metal bearings. In case, through carelessness, a phenolic bearing is allowed to run dry and thus become overheated, the surface becomes charred in time, but the pungent odor given off is likely to draw attention to the fact that the bearing has become hot. Even then, however, the shaft is not injured, as it is likely to be when a metal bearing runs hot.

Phenolic bearings can be provided with thrust rings when required and can also have external keys to prevent them from turning in the housing when this is necessary. They have been produced in sizes from 1 in. to 30 in. in diameter and in wall thicknesses from $^1/_8$ in. up. For use in machines in which food may come in contact with the bearing, a specially treated resin, free from odor and taste, may be employed for impregnating. The use of phenolic bearings is to some extent comparable with that of oil-impregnated lignum vitae, which is sometimes used in place of metal, but the phenolic material is harder than lignum vitae and should be capable of carrying heavier loads. When substituted for metal, no change in dimensions are usually necessary. If the phenolic bearing is impregnated with graphite, the latter imparts some of its lubricating properties to the bearing surface, but such lubrication is not essential to successful use, as the surface is smooth and quite wear resistant.

In view of the success attained thus far in the use of phenolic bearings, there would seem to be no reason why they should not see still wider application in many

places where plain bronze or babbitt bearings are now employed. Although the cost per pound is much greater than for the metal type, in some instances, at least, the materia' weighs only or about one seventh as much as bronze and lasts much longer, hence is likely to cost the user less than plain metal types. Phenolic bearings are also much less expensive than anti-friction types of bearing. Many sizes can be had from stock molds, but special forms may require some extra charge for special forming equipment. As the bearings are dielectrics, they have advantages in preventing electrolytic action when that is a factor of importance.

AUTOMOTIVE USES OF PLASTICS ARE CONSTANTLY GROWING

(*Continued from page 43*) qualities very similar to the acetates but soften at lower temperatures, though they are non-inflammable.

One of the large rubber companies is making a new rubber-base plastic called Plioform, which is a true thermoplastic very different from ordinary rubber but in physical qualities somewhat like acetate. Another large rubber producer has developed a styrol plastic called Victron, but has marketed it as yet only in limited quantities as it is quite high in cost. Both of these and some other plastics give promise of future use and may yet find automotive applications of importance if produced at an attractive price.

Each of the plastics has its own good points as well as certain limitations which the user should keep in mind. The phenolic and urea types and certain of the cold-molded forms are rendered insoluble and infusible by the curing process to which they are subjected in molding. Nearly all other types soften when heated and can be remolded. The latter are termed "thermo-plastics" while the type that sets permanently is called "thermo-setting." Nearly all plastics have fair to excellent dielectric properties and many are well suited for radio work as well as for structural purposes. Thus, the designer has opportunity for a wide choice. He should, however, study the properties of the various plastics and become acquainted with their applications if he wishes to use them to best advantage.

REPOUSSÉ, INLAY, AND LAMINATION

(*Continued from page 16*) mass production, the ornamentation has been along more simple lines. Many interesting shapes and useful items have appeared which depend upon their outline and intelligent combinations of color for their attractiveness, rather than upon any definite additional embellishment.

Metal cemented to or molded into plastic, for instance, as in the orange handled spoon. Through this combination we enjoy multi-colored handles on knives and forks and other tableware to match the moods and

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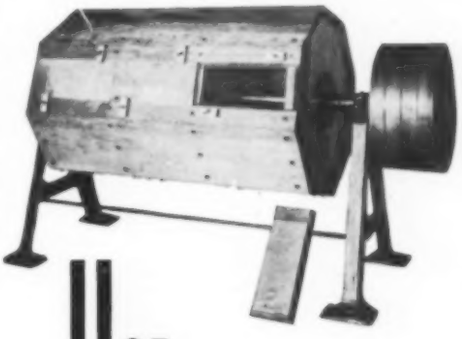

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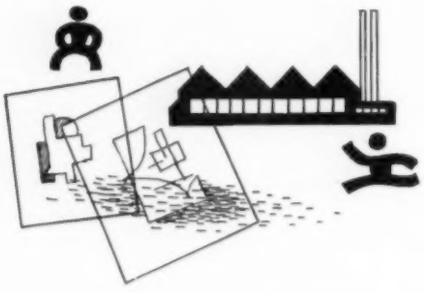

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colors of the decorative motif of the particular dinner at which they are used. The fact that they have been produced within the price range of the most humble has given them a broad acceptance without any sacrifice of class distinction. Such tableware is equally desirable and "at home" on a grand Italian refectory table laid for an informal dinner or on the oilcloth covering of the kitchen table at camp. It lends an inimitable cheeriness to either occasion.

Decalcomania has been successfully used when applied to the finished piece, as shown by the child's mug.

Colors are easily combined by cementing as shown in the two-piece red and black champagne glass. A combination which lends a note of gaiety to a glass that never chips and is hard to break. Combinations of this sort are by no means limited to tableware. Imagination points again to the possibilities of boxes and containers with contrasting covers and panels with sales appeal measured only by the good taste of the designer.

Dials and gadgets have long since found their place in plastics and their success is a matter of tradition. The ivory radio dial illustrated shows the effect of pigment rubbed in over embossing or etching.

Obstacles may present themselves in the molding of difficult shapes, but what worth while project is there which is accomplished without obstacles! The refreshing texture of the finished piece and the unlimited opportunity for ornamentation invite the effort of every molder with a creative mind and pioneering spirit to develop discriminating designs and adapt plastics to original uses that will definitely mark his product as outstanding. This will open many channels of distribution which are now depending upon materials of far less permanence and merchandising attraction.

For the difficult piece, a mold may be split once or many times if necessary. A flare-foot cocktail tumbler with fluted sides may be cast from a mold which is split once. The mold is split at the edge of one of the flutings on either side of the piece and barely shows.

The ivory skull with a separate lower jaw which moves quite naturally with a spring hinge has many undercuts and depressions requiring a mold of many splits, and is illustrated to demonstrate what can be done if the occasion requires.

Because of their translucence and pastel colorings, some plastics are uniquely capable of translation into many useful objects. Their greatest future is probably in the field of ceramics. They are rapidly taking their place among lighting fixtures where their toughness gives advantages over glass. They lend themselves happily to the geometric demands of modern design. Ford and General Motors, among others, have adopted their use for dome lights in all their cars. Light weight and freedom from breakage in shipping recommend their use to effect sound economies. Exporters, to whom the item of freight and protection of merchandise is so important, have found, in plastic containers, a saving unattainable elsewhere.

Plastics have found general acceptance in the instrument field in thermometers, and other climatic indica-

tors; in surgical instrument cases, clock cases and radios.

Many practical uses have been already discovered but the field of ornamentation in this country has been scarcely scratched. Plastics should not attempt to imitate marble veins and wood grains for decorative effect. Its natural lustre and satin-like finish is decorative in itself, and any form of additional decoration or ornamentation should take shape in the intelligent combination of colors of like material or combinations of metals, fabrics, papers or other materials in inlay or lamination to produce pleasing and practical effects.

In this connection the Aluminum Corporation of America has recently licensed patents to many platers who are in a position to supply molders with gorgeous colored oxidized metals for etching or stamping and with powdered oxidized bronzes which may be sprinkled into the mold before casting, and which blend in an interesting manner.

It is not hard to imagine the effectiveness of such ornamentation when applied to tiles for the bathroom, or for table tops. Bridge table tops. Coffee tables. Fireplace fronts. Wall panels, or even picture frames in the modern tempo.

Among unusual things already made from plastics are false teeth and gums for dental school clinics. The teeth are fastened in place with screws and may be removed and replaced easily. Actual experimental fillings and treatments are made by students, bridgework is constructed which may later be removed and replaced at less cost than with the use of porcelain.

There is no doubt that the future of ornamentation of plastic moldings holds illimitable opportunity. The Little International Exhibit contains many additional examples as applied to Beetleware, and offers a wealth of inspiration to those who take the time to visit it.

THE ALL-MOLDED CLOCK MAKES ITS BOW

(*Continued from page 14*) in nine different types of cases, only four of which are molded. Here a concession has been made to supposedly prevalent tastes for wood and wood finishes—a concession about which others of wide experience in plastic merchandising may express some doubts. So, too, those of the more advanced schools of design may object that Pennwood has failed to carry the modernity implied by the mechanism into the execution of its outer cases. To these objections there can only be interposed the fact that, within the company's range of prices and sales outlets, the greatest possibilities for sales lay in the use of cases along more traditional lines.

Credit: For molding of time drums, base and cases, to the Chicago Molded Products Company. For material used on all drums and on marble and plain-tone cases, to Toledo Synthetic Products, Inc. For material used on walnut cases of desk model, to Bakelite Corporation.

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